4.0 Alternatives Analysis

4.1 Introduction

The California Environmental Quality Act (CEQA) and CEQA Guidelines §15126.6 require consideration and discussion of alternatives of a proposed project in an EIR. The purpose of the alternatives analysis is to identify ways to mitigate or avoid the potentially significant adverse effects that may result from implementation of the proposed Project. This chapter identifies and considers alternatives to the Eagle Mountain Pumped Storage Project (Project) in comparison to the proposed Project.

CEQA provides the following guidelines for discussing alternatives to a proposed project:

- The EIR must describe a reasonable range of alternatives to the Project that would "…feasibly attain most of the basic objectives of the project, but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." [CEQA Guidelines §15126.6(a)];
- The EIR must identify ways to mitigate or avoid significant effects of the Project on the environment: "…the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." [CEQA Guidelines §15126.6(b)];
- The range of potential alternatives to the proposed Project shall include those that could feasibly accomplish most of the basic objectives of the Project and those that could avoid or substantially lessen one or more of the significant adverse effects. If there is a specific proposed Project or a preferred alternative, the EIR must explain why other alternatives considered in developing the proposed Project were rejected in favor of the proposal. "The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination." [CEQA Guidelines § 15126.6(c)];
- The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed Project. "If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed." [CEQA Guidelines §15126.6(d)];
- The specific alternative of "no project" "shall be evaluated along with its impact." The purpose of describing and analyzing a "no project" alternative is to allow "decision-

makers to compare the impacts of approving the proposed Project with the impacts of not approving the proposed Project." The CEQA Guidelines also stipulate that the "no project" analysis "shall discuss the existing conditions at the time the (EIR) Notice of Preparation is published...as well as what would reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans..." [CEQA Guidelines §15126.6(e)];

- The CEQA Guidelines also instruct that "If the environmentally superior alternative is the No Project Alternative, the EIR shall also identify the environmentally superior alternative among the other alternatives." [CEQA Guidelines §15126.6(e)(2)]; and
- Under the CEQA Guidelines §15126.6(f), the range of alternatives required in an EIR is governed by a "rule of reason" that requires an EIR to set forth only those alternatives necessary to permit a reasoned choice:

> The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making.

4.2 Overview of the Alternative Selection Process

The alternative selection process involved the following sequence of steps:

(1) Identification of proposed Project goals and objectives

(2) Identification of potentially significant impacts of the proposed Project

(3) Development of evaluation criteria

(4) Review of a range of alternatives

(5) Identification of those alternatives that meet the criteria and explanation of why alternatives were rejected as infeasible

(6) Evaluation of alternatives based upon comparative environmental impact assessment

4.3 Summary of Goals and Objectives for the Proposed Project

Goals and objectives for the proposed Project can be summarized as follows (*see also* Project Description, Section 2.1.2):

GOAL AND OBJECTIVE #1 – Support California's Energy Policy

The state's energy policy is described in the California Energy Commission's, *2009 Integrated Energy Policy Report*. This report states that the driving force for California's energy policy is maintaining a reliable, efficient, and affordable energy system that minimizes the environmental impacts of energy production and use. The Policy Report also calls for projects that provide affordable peak power generation and storage of energy to support renewable energy production, (CEC, 2009).

The CEC recognizes that although the recent economic downturn has reduced growth in energy demand in the short-term, demand is expected to grow over time as the economy recovers. The CEC states that "it is essential that the state's energy sectors be flexible enough to respond to future fluctuations in the economy and that the state continue to develop and adopt the "green" technologies that are critical for long-term reliability and economic growth" (CEC, 2009).

GOAL AND OBJECTIVE #2 – Provide Generation to Meet Part of California's Peak Power Requirements

An additional goal of the Project is to provide hydroelectric generation to meet part of California's power requirements, resource diversity, and capacity needs. Peak demand is forecast to increase in California by 1.3 percent per year between 2010 and 2018 (Kavalek and Gorin, 2009). Additional generation will be needed to continue to meet peak power demands.

GOAL AND OBJECTIVE #3 – Provide Energy Storage for Integration of Renewable Energy Generation

Energy storage allows integration of intermittent renewable energy generation (primarily wind and solar power) for attainment of California's Renewable Portfolio Standards (RPS) and Greenhouse gas (GHG) reduction goals.

GOAL AND OBJECTIVE #4 – Provide Ancillary Services for Management of the Transmission Grid

Ancillary services – including spinning reserves, voltage regulation, load following, Black Start, and protection against over-generation – ensure reliability and support the transmission of energy from generation sites to customer loads.

GOAL AND OBJECTIVE #5 – Provide for Flexible Transmission Grid Operations

On-demand peak power generation provides operational improvements in the electrical grid to substantially improve transmission efficiency, reliability, and affordability, while fully incorporating renewable and traditional energy sources and reducing carbon emissions.

GOAL AND OBJECTIVE # 6 – Reduce Greenhouse Gas Emissions

California Assembly Bill 32, the Global Warming Solutions Act of 2006, established the goal of reducing greenhouse gas emissions to 1990 levels by 2020. Operating a "smarter" transmission grid reduces waste, thus reducing GHG emissions. Integrating renewable energy generation sources that do not produce GHG emissions, and providing GHG-free peak power generation, will displace traditional fossil-fueled GHG-producing peak power generation, thus contributing to GHG emissions reductions within the state and southwestern region.

GOAL AND OBJECTIVE # 7 – Re-Use Existing Industrial Sites
The environmental impacts of energy generation can be minimized by siting facilities on previously disturbed industrial sites such as the Eagle Mountain Mine ("brownfield" sites) rather than natural lands and habitats that have not been previously developed for intensive human uses ("greenfield" sites).

GOAL AND OBJECTIVE # 8 – Locate Energy Generation Adjacent to the Transmission Grid
By locating energy generation facilities in close proximity to the transmission grid, the environmental impacts of the construction and operation of transmission interconnection is minimized. In addition, shorter transmission interconnection results in reduced Project costs, ultimately benefiting California rate payers. The proposed Project is within approximately 15 miles of a major transmission corridor (including the 500 kV Palo-Verde Devers 1 Transmission Line and the pending 500 kV Palo-Verde Devers 2 line), serving southern California energy markets.

GOAL AND OBJECTIVE # 9 – Generate Hydropower Without Causing Impacts to Surface Waters and Aquatic Ecosystems
By developing the Eagle Mountain Pumped Storage Project in existing mining pits and utilizing groundwater for its working fluid (initial fill and annual make-up water), impacts to streams, fisheries resources, wetlands, aquatic ecosystems, and associated recreational resources that are normally associated with hydropower generation are completely avoided.

GOAL AND OBJECTIVE # 10 – Redevelopment of the Eagle Mountain Mines – Central and Eastern Pits
The Central Pit of the Eagle Mountain Mine will be utilized for the Upper Reservoir. The East Pit of the Eagle Mountain Mine will form the Lower Reservoir for the Project. The mining pits are empty and have not been actively mined for decades. The Project reservoirs will be formed by filling the existing mining pits with water. There is an elevation difference between the reservoirs that will provide an average net head of 1,410 feet. Redevelopment of these mining pits provides necessary Project components without the need for massive earthwork.

4.4 Potentially Significant Impacts of the proposed Project

Impacts that have been determined to be significant, adverse and unavoidable with implementation of the proposed Project include visual impacts of a segment of the required transmission line that can be seen from the I-10 corridor, cumulative effects of groundwater use of this proposed Project combined with a proposed landfill project and multiple solar energy projects, and emissions of NO_x from heavy equipment during construction which exceed air basin thresholds.

Mitigation is identified to reduce each of these effects, but it has been determined that these potential impacts cannot be fully mitigated, summarized as follows:

Impact 3.7-5 Aesthetic Impact of the Transmission Line from the Eagle Mountain Road to Interconnection Substation. While Project Design Features are included in the design element and mitigation measures are proposed (MM AES-3, MM AES-4), there is no mitigation available to reduce the potentially significant visual impact to a level that would be less than significant. It is therefore concluded that Project implementation would result in *unavoidable and adverse significant impacts* to aesthetic resources.

The primary mitigation for the visual effects of transmission line segment parallel to I-10 corridor from Eagle Mountain Road to new substation south of Desert Center is a single taller transmission corridor, with lines hung on lattice towers in gray or brown color to blend with background landscape.

Impact 3.12-2 Daily Emissions during Construction. Emissions are less than the South Coast Air Quality Management District (SCAQMD) CEQA thresholds for all pollutants except NO_x, where the threshold is 100 pounds per day (ppd). Mitigation (MM AQ-1 through MM AQ-13) for air quality during construction includes specific standards for construction equipment emissions controls, operations and construction. However, even with the implementation of mitigation, the proposed Project will result in a significant construction-related impact from NO_x in construction years 2012 through 2014. Therefore the NO_x impact is *significant*. Other air quality parameters will not exceed the threshold of significance

Cumulative Impact to Groundwater Supply: While potential impacts to the groundwater basin are determined to be less than significant on an individual project basis, in conjunction with water use for the proposed solar projects and Eagle Mountain Landfill, the Project would contribute to cumulative overdraft of the regional aquifer over the 50-year operational period. Mitigation for water use, water quality, and protecting the CRA includes:

- A groundwater level monitoring network will be developed to confirm that Project pumping is maintained at levels in the range of historic pumping (MM GW-1).
- Wells on neighboring properties whose water production may be impaired by Project groundwater pumping will be monitored during the initial fill pumping period. If it is determined that Project pumping is lower water levels in those wells by 5 feet or more, the Project will either replace or lower the pumps, deepen the existing well, construct a new well, and/or compensate the well owner for increased pumping costs to maintain water supply to those neighboring properties (MM GW-2).
- Seepage will be limited from the Project reservoirs to the extent feasible using specified grouting, seepage blankets, and roller-compacted concrete (RCC) or soil cement treatments. This includes the Upper Reservoir, Lower Reservoir, and the brine disposal ponds that will be part of the water quality management system for the Project. Seepage control from the Project reservoirs will be accomplished using systematic procedures (PDF GW-1).

- Two extensiometers shall be constructed to measure potential inelastic subsidence that could affect operation of the Colorado River Aqueduct (CRA); one in the upper Chuckwalla Valley near OW-3 and the other in the Orocopia Valley near OW15 (MM GW-3).
- Seepage from the Lower Reservoir will be extracted through seepage recovery wells to prevent a significant rise in water levels beneath the CRA (MM GW-4).
- Seepage from the Upper Reservoir will be controlled through a separate set of seepage recovery wells, to maintain local groundwater levels below the bottom elevation of the landfill liner (MM GW-4).
- In order to maintain total dissolved solids (TDS) at a level consistent with existing groundwater quality, a water treatment plant using a reverse osmosis (RO) desalination system and brine disposal lagoon will be constructed as a part of the Project to remove salts and metals from reservoir water and maintain TDS concentrations equivalent to source water levels (PDF GW-2).
- Water quality sampling will be done at the source wells, and within the reservoirs, and in Monitoring wells upgradient and downgradient of the reservoirs and brine disposal lagoon consistent with applicable portions of California Code of Regulations Title 27. Results of the sampling will be used to adjust water treatment volume, and to add or adjust treatment modules for TDS and other potential contaminants as needed to maintain groundwater effects at less than significant levels (MM GW-6).
- Existing wells within the central and eastern mining pits to be developed as Project reservoirs will be replaced at locations outside of the reservoirs (MM GW-7).

All other potential impacts are deemed to be mitigated to less than significant levels through implementation of the mitigation program (project design features, regulatory compliance, and Project-specific mitigation measures) identified throughout this Draft Final EIR as recommended conditions of approval.

4.5 Alternatives Evaluation Criteria

Once identified, the alternatives were evaluated based on the following criterion. An alternative had to meet all criteria to be considered for further analysis in the Draft Final EIR.

- **Criterion 1:** The alternative must feasibly attain most of the proposed Project's objectives. This criterion focuses on identifying which alternatives were capable of achieving the same results as the proposed Project (i.e., meeting the goals and objectives of the proposed Project) in a feasible manner. "Feasible" is defined in the CEQA Guidelines §15364 as: "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

- **Criterion 2:** Section 15126.6 of the CEQA Guidelines requires examination of a reasonable range of alternatives to the proposal. As part of the EIR certification process and action on the proposed Project, the lead agency determines whether or not the alternatives are feasible. Under Section 15126.6 of the CEQA Guidelines, an EIR is not required to consider alternatives which are infeasible.

- **Criterion 3:** The alternative must avoid or substantially lessen an identified significant adverse environmental impact of the proposed Project.

4.6 Alternatives Considered and Incorporated as Project Design Features

This alternatives analysis is constrained in part due to the fact that numerous alternative design elements and configurations have already been incorporated by the Project Applicant as a result of input received during the scoping and planning processes for the proposed Project, with a goal to limit environmental impacts of the Project. Changes were made in response to comments received by public agencies, the landfill project's sponsors, and concerned citizens. Additional alternatives were identified based upon findings and recommendations of technical studies. The alternatives initially considered [and summarized below] have been incorporated into the proposed Project as design feature adjustments to the original proposal.

- Transmission route and footprint reduced from about 52 miles to about 14 miles.
- Transmission route alignment selected to follow existing transmission corridor and road corridor to the extent reasonably feasible, and the interconnection substation was relocated to avoid a sensitive historic site at I-10 and Eagle Mountain Road.
- Transmission was reconfigured from two parallel 500-kV corridors to a single double circuit 500-kV corridor on a taller single lattice tower to reduce the transmission footprint, visual intrusion, and related impacts on desert habitat and designated critical habitat areas by half.
- Well field location and well spacing was established to minimize potential interference with other area wells, and the water line corridor is collocated with existing roads and utility corridors to minimize new habitat disturbance.
- The locations, layout and footprint for the switchyard, administrative offices, RO ponds, and a segment of the transmission line have been revised to avoid conflicts with the proposed future Eagle Mountain Landfill project.

In addition, the following project design features have been included by the Applicant as a part of the proposed Project:

PDF GW-1. **Groundwater Seepage.** The Licensee will limit seepage from the Project reservoirs to the extent feasible using specified grouting, seepage blankets, and roller-compacted concrete (RCC) or soil cement treatments. This includes the Upper Reservoir, Lower Reservoir, and the brine disposal ponds that will be part of the water quality management system for the Project. Final design for seepage control will be approved by the State Water Board and FERC prior to construction. Seepage control from the Project reservoirs will be accomplished using systematic procedures that will include the following:

During final engineering design, a detailed reconnaissance of the reservoir basins and pond areas will be conducted to identify zones where leakage and seepage would be expected to occur. These areas will include faults, fissures and cracks in the bedrock, and zones that may have direct connection to the alluvial deposits of the Chuckwalla Valley. During the reconnaissance, the effectiveness of various methods for seepage and leakage control to mitigate the effects of these particular features will be evaluated, including grouting, seepage blankets, and RCC or soil cement treatments, and other methods if needed.

Methods for seepage and leakage control will include curtain grouting of the foundation beneath the dam footprint and around the reservoir rim, as needed; backfill concrete placement and/or slush grouting of faults, fissures, and cracks detected in the field reconnaissance; placement of low permeability materials over zones too large to be grouted and over areas of alluvium within the Lower Reservoir; seepage and leakage collection systems positioned based upon the results of the hydrogeologic analyses; and clay or membrane lining of the brine ponds associated with the Project's water quality management system. The collection systems would recycle water into the Project reservoirs or the reverse osmosis (RO) system.

Design and construction of a Comprehensive Monitoring Program, consisting of observation wells and piezometers that will be used to assess the effectiveness of the seepage and leakage control measures.

Based on monitoring results, additional actions may be taken to further control leakage and seepage from the reservoirs and ponds. Such measures may include curtain grouting and the expansion of seepage and leakage collection systems.

Other measures, such as use of stepped RCC or soil cement overlay on the eastern portion of the Lower Reservoir, may also be used depending on results of final engineering design analyses.

In addition, portions of the tunnels and shaft of the Project will experience very high water pressures; whereas, current plans are based on lining of the tunnels with concrete, and in some locations steel liners will be installed. These liners will also effectively block seepage from occurring.

PDF GW-2: Water Treatment Facility. In order to maintain TDS at a level consistent with existing groundwater quality, a water treatment plant using a RO desalination system and brine disposal lagoon will be constructed as a part of the Project to remove salts and metals from reservoir water and maintain TDS concentrations equivalent to the source groundwater.

Treated water will be returned to the Lower Reservoir while the concentrated brine from the RO process will be directed to brine ponds. In addition to removing salts from the water supply, other contaminants, nutrients, and minerals, if present, would be removed, preventing eutrophication from occurring.

Salts from the brine disposal lagoon will be removed and disposed of at an approved facility when the lagoons become full, approximately every 10 years. The lagoons will be maintained in a wetted condition, to maintain air quality in the Project area.

PDF BIO-1: Pre-construction Special Species and Habitat Survey. Following licensing and access to the Central Project Area, surveys for special species and habitats that could support special species will be conducted. A thorough examination of the Central Project Area and local springs and seeps will provide information to determine if any avoidance or adaptive management is required. Simultaneously, the site will be assessed for use by other wildlife. Based on the results of these surveys, the biological mitigation and monitoring program will be modified in ongoing consultation with the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW). Reporting requirements for the pre-construction surveys are specified in MM BIO-2.

PDF BIO-2: Pre-construction Plant Survey. Preconstruction surveys will identify special-status plant populations and also species protected by the California Desert Native Plants Act (CDNPA). For annuals or herbaceous perennials that are dormant during certain seasons, data from 2008, 2009, and 2010 surveys will be used to assist in locating populations during dormant seasons. Based on these combined surveys, avoidance areas in construction zones will be established for special plant resources. The perimeters will be marked with wooden stakes, at least 3 feet high, and no more than 10 feet apart. Each stake will be flagged with red and white candy-striped flagging or other obvious barrier tape.

Where avoidance is not feasible, and the species can be reasonably transplanted (e.g., foxtail cactus, Wiggins' cholla, other cacti and species protected by the CDNPA), plants will be salvaged and transplanted in areas approved in the Re-Vegetation Plan. Transplantation will be part of the Re-Vegetation Plan developed for the Project. Salvaging seed and replanting may be an option considered for certain species (e.g., smoke tree, ironwood).

PDF BIO-3: Pre-construction Mammals Surveys. Prior to construction, surveys will be conducted for all burrows that might host a badger or kit fox. (These surveys can be simultaneous with those for desert tortoise burrows.) Active burrows and all fox natal dens will be avoided, where possible. The perimeters of all avoidance areas will be marked with wooden stakes, at least 3 feet high, and no more than 10 feet apart. Each stake will be flagged with red and white candy-striped flagging or other obvious barrier tape.

Where avoidance is infeasible, occupancy of burrows will be determined through fiberoptics and/or night vision equipment. All occupants will be encouraged to leave their burrows using one-way doors, burrow excavation in the late afternoon/early evening (to encourage escape at night), or other approved methods. All burrows from which badgers or foxes have been removed will be fully excavated and collapsed to ensure that animals cannot return prior to or during construction.

PDF BIO-4: Avian Protection of Transmission Line. The Licensee will develop an avian protection plan in consultation with the USFWS. The plan will: meet Avian Power Line Interaction Committee/Fish and Wildlife Service (APLIC/FWS) guidelines for an avian protection plan: present designs to reduce potential for avian electrocution and collisions; provide methods for surveying and reporting Project-related raptor mortality and managing nesting on the proposed transmission lines; and include a workers education program.

The raptor-friendly transmission lines will be developed in strict accordance with the industry standard guidelines set forth in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*, by Avian Power Line Interaction Committee, Edison Electric Institute, and Raptor Research Foundation and the USFWS-approved Avian and Bat Protection Guidelines. The design plan (filed for FERC approval) will include adequate insulation, and any other measures necessary to protect bats and raptors from electrocution hazards.

PDF GEO-1: Subsurface Investigations. Detailed investigations to support final engineering will be conducted in two stages, as detailed in Section 12.1. These generally include:

Phase I Site Investigations: Based on available information and the current Project configuration, conduct a limited field program designed to confirm that basic Project feature locations are appropriate and to provide basic design parameters for the final layout of the Project features. Phase I Site Investigations will be initiated after licensing and receipt of site access, at the initiation of the

Project engineering design phase. Field work will be completed within six months of the start of field investigations, and results filed with the State Water Board and FERC 12 months after the start of field investigations. Phase I field work is focused on the pumped physical facilities associated with the pumped storage project to provide the owner with additional information needed to confirm feasibility and Project cost.

Phase II Site Investigations: Using the results of the Phase I work, and based on any design refinements developed during pre-design engineering, conduct additional explorations that will support final design of the Project features and bids for construction of the Project. The Phase II program will also include field investigations and modeling to support detailed evaluation of potential seepage from the Project features (reservoirs and water conveyance tunnels). Seepage evaluations will include groundwater modeling to refine plans for seepage control, seepage recovery, and monitoring as required to avoid potential adverse impacts on the local groundwater regime and water quality, the Colorado River Aqueduct and the proposed landfill if and when it is implemented. It should be noted that the Phase II program may be implemented in a number of progressive steps. Geotechnical field programs during the design stage of implementation are usually implemented in a phased or step-wise manner with subsequent field work planned based on what is learned from the preceding field work.

The scopes of the Phase I and II programs are discussed in a technical memorandum found in Section 12.1.

PDF GEO-2: **Geologic Mapping.** During site investigations, geologic mapping will be performed by Project engineers to identify conditions of the overburden and bedrock exposed in the mine pits (reservoir areas) that may affect the stability of existing slopes during reservoir level fluctuations. Mapping will identify the degree and orientation of jointing and fracturing, faulting, weathering, and the dimensions of the benches excavated during mining. The stability of the cut slopes and benches will be assessed at this time.

Geologic mapping will begin during the Phase I Site Investigations (*See* Section 12.1 for details) and will continue during Phase II Site Investigations (*See* Section 12.1 for details).

During construction, areas within the pits that exhibit unstable slopes because of adverse fracture sets exposed in the pit walls will be scaled of loose rock and unstable blocks. Material scaled from the side slopes will be removed and disposed of outside the pit, or pushed down slope and buried in the bottom of the pit. Rock slopes within the East and Central pits that lie below an elevation of 5 feet above the maximum water level will be scaled of loose and unstable rock during construction. Existing cut slopes that lie above these elevations will not be modified unless there is evidence of potential failure areas that could impact Project facilities. Final project design will be reviewed by the State Water Board and approved by the FERC.

PDF AES-1: Staging Areas. Staging areas and areas needed for equipment operation, material storage and assembly shall be combined with construction lands to the extent feasible, and organized to minimize the total footprint needed. Staging, storage, and temporary construction areas shall be reclaimed as soon as the use of each such area is completed.

PDF LU-1: Construction Access. Construction access to/from the substation site will be from the Eagle Mountain Road exit and follow the Frontage Road east to the site. The Contractor will be responsible for monitoring construction access points.

PDF LU-2: Construction Monitoring. Two weeks prior to beginning construction, notices shall be posted locally stating hours of operation for construction near the Desert Center community and along State Route 177.

PDF LU-3: Pipeline Construction. Impacts from water pipeline construction will be minimized or avoided by: (1) grading out the sidecast to meet existing grades; (2) minimizing disturbance, and construction timing to avoid seasonal rain, and maintaining surface contours and natural function of washes crossed; and (3) use of existing access roads, when feasible, thereby avoiding new ground disturbance.

PDF LU-4: Coordination with Adjacent Projects. The Project layout has been modified to eliminate conflicts with existing and proposed land uses. For example, construction staging and lay-down areas have been relocated to a parcel southwest of the Lower Reservoir and outside of the proposed landfill to eliminate conflict with the proposed landfill truck marshalling and railyard facilities. Low voltage cables from the underground powerhouse have been routed through the underground powerhouse access tunnel to avoid conflicts with landfill Phase 3. Water treatment facilities have been relocated further from the Colorado River Aqueduct (CRA) to address concerns of the Metropolitan Water District of Southern California (MWD) regarding the proximity of the brine ponds to the CRA.

These efforts will continue during the final design and construction of the proposed Project. Because several large and complex projects are proposed in the same general area (including the landfill project and several proposed solar energy projects), detailed coordination will occur as the Project progresses in order to eliminate conflicts of facility locations, supporting infrastructure, designs, permits, and operations. The Licensee will be required to have regular Project coordination meetings with the owners of the landfill project, the adjacent solar projects, MWD, and any other interested landowners and Project developers during construction of the Project. As the Project progresses into the design phase, the Project layout will be designed to preserve landfill capacity in Phases 1 through 4.

PDF LU-5. Public Outreach Program. The Licensee will hold public meetings in the Project area to brief the public on project activities and to hear and respond to comments. These meetings will be held quarterly in the Project area during engineering and construction and annually during Project operation for the life of the Project.

4.7 Alternatives Considered but Eliminated from Further Analysis

A number of alternative Project components were considered that were ultimately judged not to be reasonable under the circumstances of this Project. Based upon this determination, the components were eliminated from detailed study.

4.7.1 Pumped Storage Location Alternatives

The proposed Project is located at the site of the former Kaiser Iron Mine, an open-pit operation that ceased iron ore production in the 1980s. The site is located near the Eagle Mountain townsite in Riverside County, California, approximately 30 miles east of Indio, California and 13 miles north of I-10 and the community of Desert Center.

The site was selected for pumped storage for the following reasons:

- Two existing, mine pits are located within 14,000 feet of each other, with an elevation difference between the pits of approximately 1,500 feet. The pits can be used for water storage, with the Central Pit serving as the Upper Reservoir and the East Pit serving as the Lower Reservoir for a hydroelectric pumped storage development. The storage space available in the two mine pits is about 28,000 acre-feet in total. Construction of dams to create this amount of storage could cost up to $190 million at sites with similar topography that would require major dams. Thus this site offers a rare opportunity to minimize costs of developing reservoir storage.
- The site has been previously disturbed by mining, thus reducing potential environmental impacts.
- The geology of the Project area is dominated by rock formations comprised of good quality materials for construction of the dams, water conveyance tunnels, and underground chambers associated with a pumped storage project.
- The site is within about 13 miles of a National Interest Electric Transmission Corridor, which includes the Palo Verde to Devers corridor, which extends from the Palo Verde Nuclear Plant in Arizona to the Devers Substation near Palm Springs. The Project proposes to interconnect to the planned Devers-Palo Verde No. 2 transmission line, 13.5 miles from the Project site.

- The site is located close to an adequate source of water, the Chuckwalla Valley Aquifer (groundwater) to initially fill the reservoirs and to provide makeup water for evaporation and seepage.
- The site has potential to firm the energy produced by a growing regional portfolio of solar and wind power projects making them even more valuable to meet California's energy needs. California's Renewable Portfolio Standards (RPS) call for 33 percent of electrical generation to come from renewable sources by 2020.
- The site is located near existing and proposed renewable energy generation, including the San Gorgonio Pass wind farm west of the community of Palm Springs. Major large scale solar projects, totaling more than 2,000 MW, are proposed for the Chuckwalla Valley, Palo Verde Mesa, and surrounding desert areas.
- The site has no surface water or fisheries and has no potential to detrimentally affect aquatic ecosystems.

There are no other alternative sites for pumped storage development with the above-noted attributes. The Black Eagle pits on the Kaiser Mine site were considered as alternative pumped storage project locations, but dismissed. The North Black Eagle Pit and South Black Eagle Pit are to the west of the Central Pit, which is currently proposed as the Upper Reservoir. The larger of the Black Eagle pits, (North Black Eagle Pit), may be able to provide storage equivalent to that proposed for the Project, while South Black Eagle Pit is much smaller. The elevation of the rim around North Black Eagle Pit is approximately 400 feet lower than the proposed maximum water surface elevation on the Upper Reservoir (Central Pit). A pumped storage project between the Central Pit and North Black Eagle Pit would be significantly smaller in capacity than the proposed Project because of the smaller hydraulic head between the two reservoirs, resulting in a Project of approximately 370 MW rather than 1,300 MW for the proposed Project. Similar concerns identified by Kaiser for the proposed Project regarding landfill compatibility exist for this alternative configuration since the Central Pit would still be part of the Project. Concerns about seepage affecting the landfill liner and monitoring systems, and about incompatibility of facilities, would not be alleviated by this alternative.

A pumped storage project between North Black Eagle Pit and the proposed Lower Reservoir (East Pit) would develop 400 less feet of total hydraulic head reducing the Project from 1,300 MW to about 930 MW. Similar concerns identified by Kaiser regarding landfill compatibility for the proposed Project would exist for this alternative configuration as well. For these reasons, the alternative of using the Black Eagle pits were considered and rejected because they would have significantly smaller capacity to meet the goals and objectives of the Project, but would not result in reduced environmental impacts.

Therefore, no other sites have been considered by the State Water Board for developing the proposed Project.

4.7.2 Water Treatment Alternatives

The Project proposes to use RO water treatment to maintain water quality in the reservoirs at the same quality as the source groundwater. Other alternative methods of water treatment were considered. The alternatives considered include:

> **Thermal Processes** (e.g., Multistage Flash Distillation)**:** This type of water treatment is used in applications such as desalination in the Middle East, where power generation is needed as well as very large capacity (25 to 100 mgd) water treatment. With these systems, the power cycle is designed to provide waste heat which is used for thermal distillation. These types of water treatment plants are very costly and require a heat source. This option is not feasible for the proposed Project, where there is no heat source and the water treatment needs are at a smaller scale.
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> **Conventional Demineralization Using IX Resin** (DI)**:** These types of water treatment are only economical when the TDS of the water is low (less than a few hundred mg/l). In addition, these systems utilize large quantities of acid and caustic materials to regenerate the resin. This would create an additional waste stream (spent regeneration solution) which would need to be neutralized and for which there is no easy disposal option. For these reasons, this alternative was dismissed from further consideration for the proposed Project.
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> **Electrically Driven DI:** These systems (sold as EDI [electrical demineralization]) or sometimes called CDI), do not use chemicals (except to clean the resin), but applies an electrical field driving the ions to the resin. Some of these types of systems can only operate on softened water as the hardness can foul the resin. Operating costs for this technology are high and increase with increasing TDS. These systems are generally used as polishing technology after RO to produce boiler feed water, or high purity water for semiconductors. They are not used, as a general rule, as a primary treatment step.

After review of the available water treatment options, it was concluded that RO is the most practical and cost efficient means of maintaining water quality in the reservoirs.

4.7.3 Alternative Power Sources

An alternative of increasing wind and solar generation was considered but dismissed in the analysis. Additional wind and solar generation would not meet Project objectives # 2 (Provide Generation to Meet Part of California's Peak Power Requirements), #3 (Provide Energy Storage for Integration of Renewable Energy Generation), #4 (Provide Ancillary Services for Management of the Transmission Grid), or #5 (Provide for Flexible Transmission Grid Operations) and therefore were rejected from further consideration in the Draft Final EIR.

Distributed generation (DG) is another energy resource considered, but dismissed, as a suitable alternative to the proposed Project. DG has been defined in many ways. It is most commonly defined as the generation of electricity near the intended place of use. The California Energy

Commission assumes the following definition: "DG is electric generation connected to the distribution level of the transmission and distribution grid usually located at or near the intended place of use" (CEC, 2002). DG systems can be sized to meet a facility's total electrical requirements or they can be sized to partially replace or supplement electrical service from the grid. DG systems typically range in size from less than a kilowatt to tens of megawatts, although an individual unit's generating capacity depends on allocable space and size of load (CEC, 2002).

DG is available using a variety of technologies, including internal combustion engines, fuel cells, photovoltaic cells, and wind turbines (CEC, 2002). While distributed generation reduces the need for, and environmental impacts of, some transmission facilities, DG alone will not be sufficient to meet California's energy demand. At the present time, DG facilities in California represent less than 800 MW of generating capacity, or little more than 1 percent of the approximate 67,000 MW of in-state generation supplies (ITron, 2010). Although California has a number of programs in place to incentivize the use of DG in California, there will continue to be a need for other renewable energy sources to meet California's energy needs. Therefore, DG cannot be considered as an alternative which will be a viable substitute for other energy generation.

DG energy storage (technologies such as compressed air energy storage (CAES), batteries, flywheels, electrochemical capacitors, superconducting magnetic energy storage (SMES), power electronics and control system devices) are emerging technologies which are generally not available on a commercial scale. Because of the small scale and experimental nature of these technologies, they do not meet the goals and objectives of the Project (*see* Goal and Objective #2, Provide Generation to Meet Part of California's Peak Power Requirements; Goal and Objective #4, Provide Ancillary Services for Management of the Transmission Grid; Goal and Objective #5, Provide for Flexible Transmission Grid Operations; Goal; and Objective #7, Re-use Existing Industrial Site, and Goal; and Objective #9, Generate Hydropower Without Causing Impacts to Surface Waters and Aquatic Ecosystems).

The purpose of the proposed Project is to provide hydroelectric generation to meet part of California's peak power requirements, resource diversity, and capacity needs. Other forms of energy generation can provide peaking power, but not provide energy storage benefits. For example, natural gas power can provide peaking power but will not meet Project Objective #6, Reduce Greenhouse Gas Emissions. Only pumped storage hydropower provides peaking power *and* energy storage, needed to enable the growth of wind and solar power in the region. Pumped storage hydroelectric generation is the only energy storage technology to have been proven on a large scale.

In addition, pumped storage hydropower provides ancillary services to the transmission grid: spinning reserves, voltage regulation, load following, black start, and possibly protection against over-generation.

Pumped storage hydropower can provide these critical energy benefits without producing greenhouse gas emissions. Pumped storage can reduce greenhouse gas emissions by enhancing the efficiency of renewable energy and reducing reliance on fossil fuel generation for peak power generation. No other form of energy generation provides this combination of benefits.

4.7.4 Energy Storage Alternatives

Alternatives of storing energy using other energy storage technologies was considered but dismissed as these alternatives do not meet the objectives of the proposed Project, specifically Goal and Objective #2 Provide Generation to Meet Part of California's Peak Power Requirements, Goal and Objective #8 – Locate Energy Generation Adjacent to the Transmission Grid, and Goal and Objective #9 – Generate Hydropower Without Causing Impacts to Surface Waters and Aquatic Ecosystems.

In addition, alternative energy storage technologies would not meet Goal and Objective #1 – Support California's Energy Policy. This is because the Energy Policy Report calls for projects that provide *affordable* peak power generation and storage of energy to support renewable energy production (emphasis added). All of the alternative technologies examined are more costly than pumped storage.

Pumped storage is the largest-capacity form of grid energy storage currently available. Projects generally range in size from 500-1,500 MWs, with the proposed Project at 1,300 MW. This application has the highest capacity of the various energy storage technologies that experts have assessed (Figure 4.7-1).

Pumped hydroelectric energy storage is a mature technology that utilities use at many locations in the United States and around the world, with more than 127,000 MW installed worldwide. Pumped storage systems are by far the most widely used form of energy storage currently in use, the next closest options are compressed air energy storage, with 440 MW, and sodium-sulphur batteries at 316 MW.

Energy storage technologies, and their advantages and disadvantages, are described in the following sections.

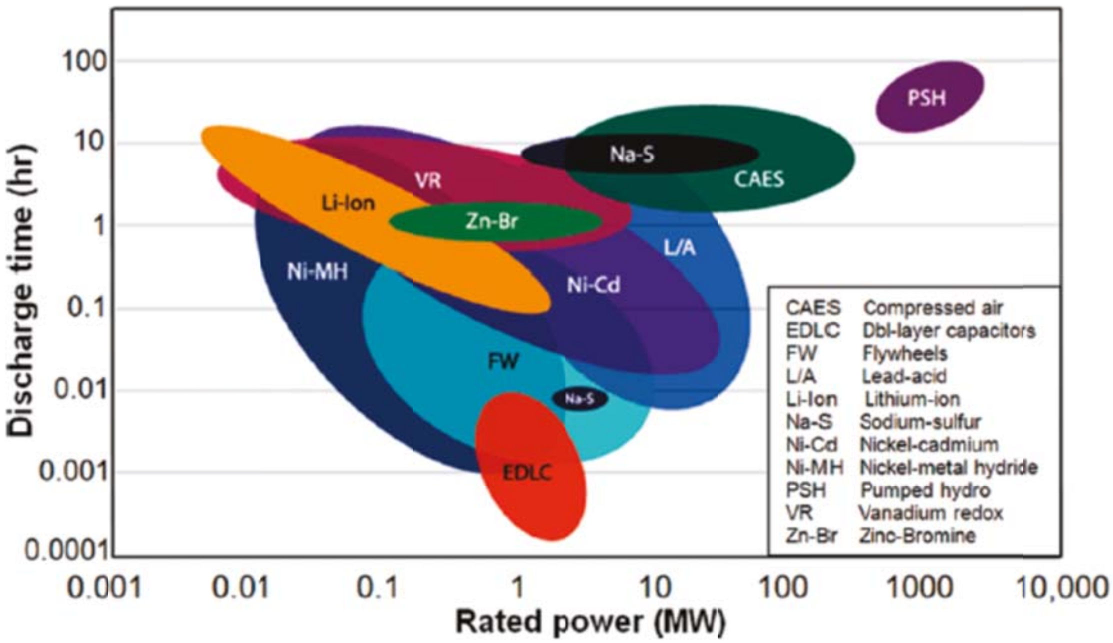


Figure 4.7-1. Comparison of power and discharge time for various energy storage devices. Source: Yang, 2011.

4.7.4.1 Electrochemical Energy Storage

Batteries take in electricity from another producing source, convert the electricity to chemical energy, and store it as a liquid or solution. When operators need energy from the battery, an electric charge chemically converts the energy back into electrons, which then move back into a power line on the electric grid.

The use of batteries as a grid scale energy storage tool is relatively undeveloped and experimental at this time. In addition, costs are high, and the materials to construct the batteries must be mined and then later disposed of safely.

4.7.4.1.1 *Advanced Lead-Acid Batteries*

During discharge in a traditional lead-acid battery, sulfuric acid reacts with the lead anode (positive electrode) and cathode (negative electrode) to create lead sulfate. The process reverses during charge. This conversion produces a short, powerful burst of energy, such as needed to jump start a vehicle.

Over time, a lead-acid battery can lose its charge due to the gradual crystallization and build-up of lead sulfate within the battery's core. The corrosive acid also can eat away at a battery's core (Abele, et. al., 2011). The limited cycle life incurs a high life-cycle cost (Figure 4.7-2). In addition, it takes about 5 times as long to recharge a lead-acid battery to the same charge capacity as it does to discharge (Yang, 2011).

Lead-acid batteries are a mature and proven technology in use in a number of applications including frequency regulation, bulk energy storage for variable renewable energy integration, and distributed energy storage systems. The largest installation is a 10 MW/40 MW flooded lead-acid system in Chino, California. The battery demonstrated the value of stored energy in the grid, but its limited cycling capability, along with high maintenance, made its life-cycle cost unacceptable (Yang, 2011). This technology has potential for storing renewable energy, but engineers must work to understand the technology's limitations and to find ways to bring down the cost (Abele, et. al., 2011).

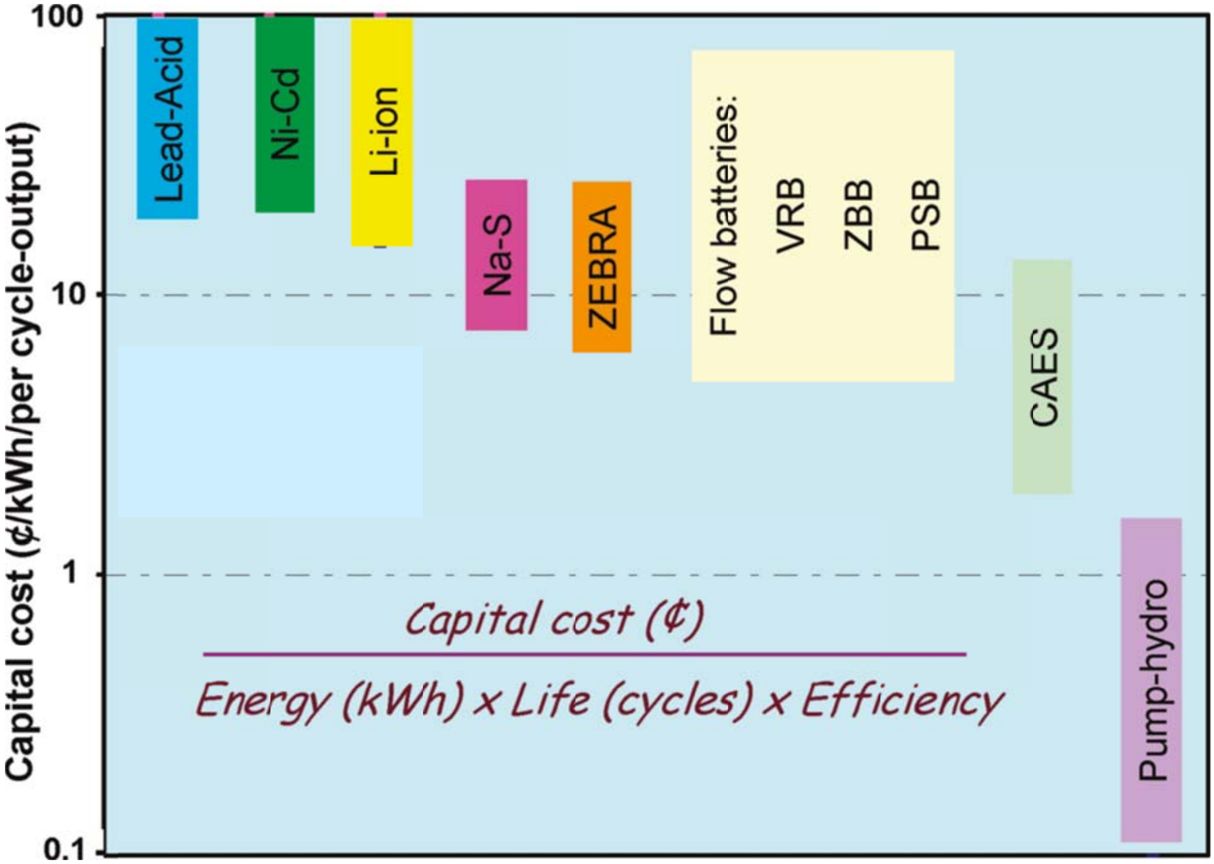


Figure 4.7-2. Comparison of varied electrical storage technologies. Note: carrying charges, operation and maintenance, and replacement cost not included. *Source:* Yang, 2011.

4.7.4.1.2 *Lithium-Ion*

In a Lithium-ion (Li-ion) battery cell, positively charged lithium ions migrate through a liquid electrolyte (fluids that conduct electricity) while electrons flow through an external circuit. Both move back and forth from one side to the other. This movement creates and stores energy. Li-ion batteries store energy in various compounds, composed of layers of different elements, such as lithium, manganese, and cobalt (Abele, et. al., 2011).

Although Li-ion batteries have been a success for small electronics such as cell phones and laptop computers, larger versions are expensive, prone to overheating, and susceptible to electrical shorting. The most notable scaled-up application of Li-ion batteries so far has been for transportation applications, such as hybrid electric vehicles (Yang, et al., 2011). While engineers have made substantial progress over recent years toward improving this technology, they will need to make further advances to extend life, improve safety, and reduce materials cost for this to be an attractive alternative for stationary applications (Abele, et. al., 2011).

4.7.4.1.3 *Flow Batteries*

A flow battery is a type of rechargeable battery that stores electrical energy in two tanks of electrolytes. When operators need energy, they pump liquid from one tank to another. During this slow and steady process, the technology converts the chemical energy from the electrolyte to electrical energy. When operators need to store energy, they reverse the process. The size of the tank and the amount of electrolyte the battery can hold determine the amount of energy the battery can store (Abele, et. al., 2011).

Flow batteries may be good candidates for backup energy storage up to 12 hours. They may also support integration of variable renewable energy. This technology has potential for grid applications if developers can manufacture it in a variety of sizes and make it portable and more affordable (Abele, et. al., 2011). At present, the technology is expensive in terms of both capital cost and life-cycle cost (Figure 4.7-2) (Yang, 2012).

4.7.4.1.4 *Sodium-Sulfur Batteries*

The sodium-sulfur battery uses sulfur combined with sodium to reversibly charge and discharge, using sodium ions layered in aluminum oxide within the battery's core. The battery shows potential to store lots of energy in a small space. In addition, its high energy density and rapid rate of charge and discharge make it an attractive candidate for applications that require short, potent bursts of energy (Abele, et. al., 2011).

Sodium-sulfur batteries are a commercial energy storage technology with applications in electric utility distribution grid support, wind power integration, and high-value electricity services. The largest system, under construction in 2011, is a 34-MW/238MWh (7 hour) system in Japan (Yang, et. al., 2011). However, materials are expensive, and safety concerns remain with respect to the high operating temperature of the battery. Researchers believe that modifying the shape of the battery can improve efficiency, lower the operating temperature, and reduce cost (Abele, et. al., 2011).

4.7.4.2 Thermal Energy Storage

Thermal energy storage comprises a number of technologies that store thermal energy in energy storage reservoirs for later use. Operators can employ them to balance energy demand between daytime and nighttime. Operators maintain the thermal reservoir at a temperature above (hotter) or below (colder) than that of the ambient environment. The applications include concentrating sunlight to produce electricity from solar thermal energy during non-solar periods and the production of ice, chilled water, or salt solution at night, or hot water, which the devices use to cool / heat environments during the day. The key challenges for solar thermal storage lie in further cost reductions and perfecting designs to store solar heat later into the peak electrical period (Abele, et. al., 2011).

4.7.4.3 Hydrogen as an Energy Storage System

Hydrogen as an energy storage system involves four processes. First, a device must produce hydrogen. In a grid energy storage application, the most appropriate production technology is the electrolysis of water using electricity. Second, after electrolysis produces the hydrogen, a device must store it, either in gaseous or liquid form. Third, in many instances, the hydrogen must be transported by truck or pipeline to a distant location. Fourth, to return electric power to the grid, the devices must convert hydrogen to electricity by either a fuel cell or a combustion engine or gas turbine generator (Abele, et. al., 2011).

The primary limitations of hydrogen energy storage systems include the maturity of the fuel cell technology; the durability of fuel cells and electrolyzers; and the capital cost of fuel cells, electrolyzers, and, to a lesser extent, storage vessels. The scale of fuel cells and electrolyzers with respect to grid storage applications and the efficiency of fuel cells and electrolyzers also limits the use of the technology, with roundtrip energy efficiencies of 31-35 percent (Abele, et. al., 2011).

4.7.4.4 Mechanical Energy Storage

Mechanical energy storage systems include compressed air systems and flywheels. Pumped storage is also considered a mechanical energy storage system.

4.7.4.4.1 *Compressed Air Energy Storage*

Compressed air energy storage technology stores low cost off-peak energy, in the form of compressed air, typically in an underground reservoir. Operators then heat the air with the exhaust heat of a standard combustion turbine and release it during peak load hours. Operators convert the heated air to energy through expansion turbines to produce electricity (Abele, et. al., 2011).

Compressed air energy storage systems suffer from reduced roundtrip efficiency associated with the cooling/reheating process. Air cooling between compression stages, although necessary, results in a loss of heat energy (Abele, et. al., 2011).

Compressed air energy storage systems also produce carbon dioxide (CO2) emissions from the reheating process, usually performed by direct combustion with natural gas (Abele, et. al., 2011), and thus do not meet the project Goal and Objective #6 - Reduce Greenhouse Gas Emissions. These systems consume about 35 percent of the amount of premium fuel consumed by a conventional combustion turbine, and thus they produce about 35 percent of the pollutants as a combustion turbine (Yang et al., 2011). Some compressed air energy storage systems under development, such as advanced adiabatic compressed air energy storage, use a thermal energy storage unit that absorbs heat from the hot compressed air and saves the heat energy for later use to reheat the air before expansion, thus avoiding CO_2 emissions (Abele, et. al., 2011).

Compressed air energy storage systems have specific geographic requirements such as depleted aquifers, salt domes, caverns or other rock formations for air storage. Also, the effectiveness and economy of compressed air energy storage systems has not been fully proved (Yang et al., 2011).

4.7.4.4.2 *Flywheels*

Flywheel energy storage works by accelerating a rotor (flywheel) to a very high speed, maintaining the energy in the system as rotational energy. When operators extract energy from the system, they reduce the flywheel's rotational speed as a consequence of the principle of conservation of energy. Adding energy to the system correspondingly results in an increase in flywheel speed (Abele, et. al., 2011).

Developers have matured flywheel technology through the advent of strong, lightweight materials, microelectronics, and magnetic bearing systems. The first 1 MW flywheel system was put in service in 2008 in New England (Yang et al., 2011). Overall, flywheels are high efficiency and have a long life cycle, a wide range of operating temperatures, and higher power and energy density on both a mass and volume basis. However, flywheels still present high costs and technology limitations, including modest energy storage capacity (Figure 4.7-1) and efficiency losses associated with the bearings (Abele, et. al., 2011).

4.8 Transmission Alternatives

The proposed Project interconnection route generally parallels Eagle Mountain Road and terminates at an Interconnection Collector Substation at Desert Center, which will be adjacent to the proposed Devers-Palo Verde No. 2 (DPV2) line to be developed and owned by Southern California Edison (SCE). The Collector substation could serve the proposed solar projects in the Chuckwalla Valley as well. The approximate length of the interconnection line is 13.5 miles. The proposed Devers-Palo Verde No. 2 is a 500-kV line that will be under the operational control of the California Independent Systems Operator (CAISO) as part of the restructured California electrical utility industry. The proposed routing from the Project was selected as the one that would most economically supply power to, and receive power from, the southwestern grid.

The Applicant evaluated several potential points of interconnection to the transmission grid. In the initial planning stages (in 2007), the Applicant considered an interconnection request to connect at the Devers Substation, near Palm Springs. This would have required an interconnection line of 83 miles, through an already crowded transmission corridor. Obstacles to this alternative include cost for construction; difficulty of obtaining rights-of-way, particularly in the communities of Indio and Cathedral City; potentially significant impacts to the natural and human environment; and cultural resource concerns of the Aqua Caliente Band of Cahuilla Indians.

As an alternative, in 2008 the Applicant proposed to interconnect at SCE's proposed Midpoint Substation (also known as the Colorado River Substation). This proposal was presented in the Pre-application Document (filed with the FERC January 2008), and the Draft License Application (filed with the FERC in June 2008). This proposed route was 50.5 miles from the Project site to the point of interconnection. The proposed route crossed the Chuckwalla Valley Dune Thicket Area of Critical Environmental Concern (ACEC), and required a crossing of the I-10.

The Project requires a double circuit 500 kV line, which will require construction of new transmission towers to support and route to the interconnection substation. A comment from the USFWS at the scoping meeting suggested that the Applicant consider installing its transmission lines on existing transmission towers owned by the MWD. This is not a feasible alternative given the size of the towers, the size and weight of the new lines, and alignments of existing transmission lines in the area.

A substation site located at the I-10 and Eagle Mountain Road junction was considered but dismissed due to cultural resource concerns related to the historic (World War II) Desert Training Center hospital site. In addition, this location may have conflicted with an existing high pressure gas line.

While the transmission alternatives of interconnecting at the Devers Substation and the Colorado River Substation have been considered and dismissed, the Applicant has continued to evaluate other interconnection alternatives. Two additional substation alternative locations (east and west of the unincorporated community of Desert Center) have been studied in detail, as described in Section 4.9 below.

4.8.1 Water Supply Alternatives

The water supply alternative selected was groundwater. The Applicant has acquired land to develop groundwater in the Chuckwalla Basin for the initial fill and annual make-up water for the reservoirs. Three wells will be utilized to provide initial reservoir fill. Water to replace losses due to seepage and evaporation will be obtained from the same source via a single well, with an additional well maintained as backup. The Applicant will connect new wells to a central collection pipeline corridor (Figure 2.2-2).

Alternatives for supply of the initial filling and for water to make up for evaporation and seepage are limited. The Project is not located on a natural stream nor would the small drainage area that would flow into either or both of the reservoirs provide nearly enough water to offset seepage losses and evaporation. Therefore, the water supply must come from either local groundwater, or through the MWD's CRA.

4.8.1.1 Water Supply from the Colorado River Aqueduct

The Applicant investigated the alternative of purchasing water from a third party and having the water delivered to the MWD. In exchange, the MWD could provide the same amount of water at the CRA. Potential sources of water supply for the exchange would most likely come from the purchase of surplus treated water from the San Joaquin Valley. The CRA could also be the source of make-up water supplies; however, it would require long-term contracts for exchange water and for wheeling through existing facilities.

This alternative was rejected for several reasons. Several potential vendors were approached regarding the purchase of surplus water. While it is possible to make an arrangement of this type, it is difficult to find willing sellers during drought years. The Eagle Mountain Pumped Storage Project will need make-up water every year, including drought years. In addition, the costs and environmental permitting requirements are a significant barrier. The potential for an arrangement of this type was discussed with MWD staff, but the MWD Board would need to approve of any such wheeling or exchange agreement. MWD has declined the request to sell water to ECE as all available water supplies are needed to supply the water demands of MWD's member agencies. In addition, Section 131 of the Metropolitan Water District Act (Cal. Stat. 1969, Chapter 209) precludes Metropolitan from selling water outside of its service area, unless such sale is made to the federal government or for the purpose of generating electric power which is used directly or indirectly, through exchange, for pumping, producing, treating or reclaiming water for use within the District. The Eagle Mountain Project is located outside Metropolitan's service area, and Metropolitan has entered into long-term power contracts that provide ample electrical power for operation of the CRA.

Perhaps most important, water supplies in the CRA may contain quagga mussels (*Dreissena bugensis*). Quagga mussels are destructive invasive aquatic species that grow to about an inch in diameter. They reproduce quickly and in large numbers. Once established, eradication is extremely difficult though new technologies are becoming available. Their establishment in the proposed Project reservoirs could result in severe economic consequences. They attach to submerged surfaces such as water intakes in massive colonies and in doing this they can clog water intake structures hampering the flow of water. U.S. Congressional researchers estimated that an infestation of the closely-related zebra mussel in the Great Lakes area cost the power industry $3.1 billion in the 1993-1999 period, with an economic impact to industries, businesses, and communities of more than $5 billion (California Department of Fish and Wildlife, http://www.resources.ca.gov/quagga/docs/quagga_FAQs.pdf). The introduction of quagga mussels into the Project reservoirs would be highly undesirable.

Finally, pumping of local groundwater would use less energy than surface water alternatives involving water transfers. Therefore, the alternative of acquiring project water through the CRA was determined to be infeasible, does not reduce adverse environmental effects, and was not considered further.

4.8.1.2 Water Supply From Other Groundwater Basins

Pumping groundwater from other surrounding basins was considered as an alternative to the Chuckwalla groundwater basin. The Pinto and Orocopia Basins were not considered as viable alternatives because they are hydraulically connected to the Chuckwalla Groundwater Basin.

Therefore, pumping groundwater from these subbasins would have at least the same, or (because they are substantially smaller basins) potentially increased, environmental effects than pumping groundwater from the Chuckwalla Groundwater Basin. In addition, the Pinto Basin is located within Joshua Tree National Park. It would not be possible to obtain permits to construct new wells within the Park.

Table 4.8-1 reviews the key parameters of other surrounding groundwater basins. Each alternative was assessed based on groundwater storage and recharge, distance of pipeline, pumping lift (not including pumping from the groundwater table to the surface), and water quality.

Table 4.8-1 Groundwater Basin Attributes

Basin	No.	Surface Area (Acres)	Storage Capacity (AF)	Natural Recharge (AFY)	Quality	Distance to Project site (mi)	El. Gain (ft)
Cadiz	7-7	271,000	4,300,000	800	High TDS	70	1,200
Ward	7-3	961,000	8,700,000	2,700	High TDS in southern part of basin	45	1,100
Chocolate	7-32	130,000	1,000,000	200	High TDS, F, B	27	1,500
Coachella (Indio Subbasin)	7-21.01	336,000	29,800,000	49,000		60	2500

4.8.1.2.1 *Coachella Valley Near Highway 10*

This alternative assumes groundwater would be pumped from the Coachella Valley Groundwater Basin and transported via pipeline to the proposed Project. Conceptually, the pipeline would follow Interstate 10 over Chiriaco Summit to Desert Center, then up the Chuckwalla Valley to the proposed Project site. The pipeline for this alternative would be about 60 miles long and would require a pumping lift of about 2,500 feet. The storage capacity of the Coachella Valley Indio Subbasin is about 29,800,000 Acre-feet (AF) and has a natural recharge of about 49,000 Acre-feet per year (AFY). This basin is in overdraft by about 136,000 AFY, and has been actively managed for enhanced recharge by the Coachella Valley Water District (CVWD) for the past decade.

This alternative is not considered feasible due to the large pipeline distance, pumping lift, and existing overdraft conditions. The long pipeline would create larger surface disturbance and therefore greater environmental impact than the proposed Project. In addition, pumping from an aquifer already in overdraft would also have increased environmental impact than the proposed Project. This alternative would not avoid or substantially lessen an identified significant adverse environmental impact of the proposed Project.

4.8.1.2.2 *Coachella Canal*

This alternative assumes surface water from the Coachella Canal would be pumped via pipeline from Dos Palmas, through Chocolate Valley, into the eastern end of Orocopia Valley, follow I-10 to Desert Center, then to the proposed Project site. This alternative would require about 42 miles of pipeline and 2,500 feet of pumping lift.

This alternative is not considered feasible due to large pipeline distance and large pumping lift. The environmental impact of constructing a 42-mile pipeline and the increased demand for electricity for water pumping would be result in more severe environmental impacts than the proposed Project. This alternative would not avoid or substantially lessen an identified significant adverse environmental impact of the proposed Project.

4.8.1.2.3 *Chocolate Valley Groundwater Basin*

This alternative assumes groundwater would be pumped from the Chocolate Valley Groundwater Basin and transported via pipeline to the EMPS Project. The pipeline for this alternative would exit Chocolate Valley at the eastern end of Orocopia Valley and follow I-10 to Desert Center, then to the Project site. The total pipeline length would be about 30 miles and the total pumping lift would be about 1,000 feet.

The Chocolate Valley has a storage capacity of about 1,000,000 AF and has a precipitation recharge rate of about 200 AFY. There is no reported demand for groundwater in the Chocolate Valley (DWR 2003). Water quality is reported to have elevated levels of Boron, Fluoride, and Total Dissolved Solids (TDS). Although there is adequate storage, this alternative would not reduce environmental impacts associated with the proposed Project because of the low groundwater recharge estimate, indicating this alternative would mine groundwater from storage, resulting in basin overdraft. This storage in this basin is much smaller (1,000,000 AF) than the Chuckwalla Valley Basin (9,100,000 AF), so project usage in this basin would be a much higher percentage of total storage resulting in a higher level of impact. In addition, this alternative is not considered feasible due to the large pipeline distance, and poor water quality. This alternative would not avoid or substantially lessen an identified significant adverse environmental impact of the proposed Project.

4.8.1.2.4 *Cadiz Valley*

This alternative assumes groundwater could be pumped from the Cadiz Valley Groundwater Basin and transported via pipeline south into the Chuckwalla Valley to Desert Center, then up to the Project site. The total pipeline length would be about 70 miles and require a pumping lift of 700 feet. Cadiz Valley has a storage capacity of about 4,300,000 AF and natural recharge of about 800 AFY. Cadiz, Inc. is involved in development of a groundwater banking program in the valley. The program would entail pumping water from the Cadiz Valley and putting it into the CRA for conveyance to customers. However, the owners of the CRA, the Metropolitan Water District of Southern California (MWD) has not yet approved this use of the CRA, making the future of the Cadiz project uncertain. In addition, MWD has not approved the sale or transfer of any water from the CRA to Eagle Crest Energy. Any water coming from the CRA could contain quagga mussels, as described above. For these reasons, this alternative is considered infeasible.

4.8.1.2.5 *Ward Valley*

This alternative assumes groundwater would be pumped from the Ward Valley Groundwater Basin and transported via pipeline west to the Cadiz Valley, south into the Chuckwalla Valley to Desert Center, then up to the Project site. About 45 miles of pipeline and 600 feet of pumping lift would be required. Ward Valley has a storage capacity of about 8,700,000 AF and a natural recharge of about 2,700 AFY. High TDS values (average TDS content of 149,181 mg/L with a range of 475 to 321,000 mg/L) have been reported in the southern part of the basin which is the part closest to the project (DWR 1967). This alternative is not considered feasible due to the length of pipeline required, low recharge rates, and the poor water quality. This alternative would not avoid or substantially lessen an identified significant adverse environmental impact of the proposed Project.

4.8.2 Facility Design Configuration Alternatives

4.8.2.1 Powerhouse Location

The choice between a surface and underground powerhouse was studied early in Project development. The required depth of unit setting below minimum Lower Reservoir pool and the limited ground cover, which would result in a long length of steel-lined power tunnel, indicated that a surface powerhouse would be more costly in comparison with an underground powerhouse. An underground powerhouse could be constructed closer to the Lower Reservoir; however, this arrangement would involve a longer high-head tunnel posing greater concerns about hydraulic transients and surge control.

The underground powerhouse could be located anywhere between the two reservoirs where suitable geologic conditions exist, at a depth that satisfies the unit submergence requirements. The proposed location was selected because of the expected existence of sound granitic rock away from fractured and diverse conditions associated with ore zones, determined by evaluation of existing geologic mapping, a route for the power waterways that is near to a direct connection between the Upper and Lower reservoirs, a minimum length of steel lining of the power waterways, proximity to a suitable location for surge shafts and chambers, and a reasonable length of access tunnel at an acceptable grade from the surface to the powerhouse.

There are no other alternative sites for pumped storage development with the above-noted attributes. Therefore, no other sites have been considered for developing the proposed pumped storage Project.

4.8.2.2 Storage Capacity

The storage capacity of the reservoirs is directly related to the amount of energy storage provided by the Project. The amount of storage proposed for the Project will support continuous rated capacity generation for a period of 10 hours during each day while pumping back for a period of

12 to 14 hours during off-peak periods. (Off-peak periods are from 10:00 PM to 6:00 AM weeknights and all day on weekends.) Significant wind energy is produced at night as well. A working volume of 17,700 acre-feet will be provided, which corresponds to 18.5 hours of reservoir storage at full plant discharge (11,600 cfs). The maximum weekly energy production is approximately 91,000 MWh. Alternate generating periods and variable pump-back periods to accommodate off-peak wind and solar power generation can also be accommodated. The 10-hour generating period was selected because it provides flexibility in Project operations.

4.8.2.3 Upper Reservoir

Some flexibility exists in the selection of the minimum and maximum operating levels of the Upper Reservoir. The respective levels of elevation (El.) 2,485 and El. 2,343 were selected based on the required submergence for the intake structure at the Upper Reservoir and the energy storage required to support the intended weekly operating cycle. Also, the range of levels was checked to ensure that the maximum and minimum operating heads will remain within the range that is acceptable for reversible pump/turbines.

The foundation conditions at the Upper Reservoir are judged to be suitable for either a concrete-faced, rockfill dam or a RCC gravity dam. Selection of the type of dam will be made during final design and following intensive subsurface explorations and materials testing. The layouts presented in this application are based on constructing an RCC dam, using on-site mine tailings that would be processed and/or using materials generated from tunnel and underground structure excavations.

4.8.2.4 Lower Reservoir

The capacity of the East Pit, with the low point of its rim at El. 1,100 feet, is about 23,000 acre-feet, which exceeds the needed storage capacity for a 1,300 MW Project (total of 21,900 acre-feet, including dead storage). Therefore, no dam structures are needed at the Lower Reservoir. With the invert of the I/O structure at El. 925 feet, there is approximately 4,200 acre-feet of inactive storage. The operating levels of the Lower Reservoir, between El. 925 and El. 1092, will maintain the operating head of the pump/turbines in an acceptable range.

4.8.2.5 Water Conductors, Penstocks, Tailrace, and I/O Alternatives

The main water conductor connecting the Upper Reservoir to the powerhouse would be bored with a tunnel boring machine (TBM) or drilled and blasted into and through the Eagle Mountain, with a finished diameter of 29 feet. The choice of below-grade water conductors would minimize surface area disturbance and eliminate the potential for penstock rupture that could produce surface discharge of water transported by those underground high-pressure pipelines between the Upper Reservoir and the powerhouse. In general, the water conductor and penstock alignments will seek to follow the most direct route between the Upper Reservoir and the powerhouse, taking into consideration areas topography and subsurface geotechnical conditions.

Below the powerhouse, the tailrace tunnel will also be bored with a TBM or drilled and blasted into and through the Eagle Mountains, with a finished diameter of 33 feet. Again, this would minimize surface area disturbance. Generally, the draft tubes and tailrace tunnel alignments follow the most direct route between the powerhouse and the Lower Reservoir, taking into consideration area topography and subsurface geotechnical conditions.

Generally there are two types of reservoir intake structures for hydro-power projects, horizontal intakes and vertical drop intakes. The advantage of the vertical drop intakes ("morning glory" type) are that near maximum capacity is attained at relatively low heads. However, the disadvantage is that this type of inlet is ungated so that discharges from the Upper Reservoir cannot be stopped at the inlet in the event of an emergency. Horizontal intakes typically are gated by means of radial gates, slide gates, or an emergency bulkhead that can shut off water flow from the Upper Reservoir in the event of an emergency. For these reasons the intakes for the Upper and Lower reservoirs will be constructed horizontally.

The inlet/outlet structure at the Upper Reservoir will be located near the east end of the reservoir and will be constructed horizontally in the sloping bank of the pit. The inlet/outlet structure will use an approach channel and slope down to the tunnel invert. A fixed-wheel gate will be provided in the structure for emergency closure and for tunnel inspection. The inlet/outlet structure at the Lower Reservoir will be located near the west end of the reservoir and will be constructed horizontally in the sloping bank of the pit. The inlet/outlet structure will use an approach channel and slope down to the tailrace invert. A fixed-wheel gate will be provided in the structure for emergency closure and for tailrace inspection.

4.8.2.6 Unit Type Selection and General Arrangement

For many existing projects in the United States, and most recently proposed projects worldwide in the head range and Project size at Eagle Mountain, the use of reversible, single-stage Francis units has been preferred over the use of separate pumps and turbines. Variable speed units are becoming more common because of their importance to realizing the ancillary benefits of pumped storage and their ability to pump over wide load variations. The generating head range of 1,560 to 1,251 feet at Eagle Mountain is well within the range of these types of units. Similarly, the nominal unit size of 325 MW is within the size range having a demonstrated history of reliable operating experience in the United States and overseas. For example, the reversible units at the Bath County Project in Virginia (operational since 1985) are rated at 350 MW. At the Rocky Mountain Project in Georgia (operational since 1995) the units are rated at 283 MW and at the Raccoon Mountain in Tennessee Project (operational since 1978) the units are rated at 383 MW.

The powerhouse arrangement is based on vertical-shaft units, with the turbine inlet valves and the draft tube gates located within the main powerhouse cavern. A separate cavern downstream of the main powerhouse cavern would house the power transformers, which increase voltage from 18 kV to 500 kV. A lay-down and erection area is provided at one end of the unit bays with direct access to the access tunnel. A service and controls bay is provided adjacent to the erection area.

4.8.2.7 Powerhouse Access

Access to the site is planned via Kaiser Road and from there to branch access roads, which lead to the various Project features. The normal access to the powerhouse will be through the main access tunnel. Its portal will be located at the ground surface on the northeast rim of the East Pit at El. 1,100 from which it will extend 6,600 feet to the powerhouse floor at El. 837. The alternative of access by a shaft directly above the powerhouse was considered. However, the powerhouse will be directly below the proposed landfill, which will, if constructed, ultimately place over 200 feet of fill depth over the ground surface above the powerhouse. The potential disruption of the landfill operations as well as access to the powerhouse ruled out the shaft access option. Secondary and emergency personnel access to and from the powerhouse will be from a shaft and short tunnel segment, with the shaft day-lighting in an area that is outside of the landfill to the north and west of the powerhouse location.

4.9 Alternatives Considered and Evaluated

Based upon the criteria listed above, the five alternatives evaluated in detail are as follows:

4.9.1 Proposed Project Alternative

This alternative includes incorporation of all alternative features (identified in Section 4.6 above) and implementation of the mitigation measures identified throughout the resource analyses in this Draft Final EIR.

This is the proposed action evaluated throughout this Draft Final EIR, recognizing all of the environmentally superior alternatives that have already been incorporated throughout the planning, consultation and evaluation stages. The focus of these alternative elements has been to protect surface and groundwater quality, minimize effects on habitat, establish compatibility with the future landfill operations at Eagle Mountain; ensure that the structural integrity, hydraulic function, and water quality of the Colorado River Aqueduct are not affected; ensure that other water users in the Chuckwalla Valley are not impacted, and to minimize the length, footprint, and habitat encroachment of the water and transmission line corridors.

This alternative also assumes that all of the mitigation measures identified throughout the Draft Final EIR are adopted as conditions of approval for the State Water Board to issue the Water Quality Certification, and are fully implemented at all appropriate stages of Project development, including pre-construction, construction, and operations for the life of the Project. As examined in detail in each of the resource analyses, potentially significant impacts to all resources will be reduced to less than significant levels for all resources except air quality, visual resources, and the Project's contribution to the cumulative effect of groundwater overdraft.

Under this alternative, the two Project-specific impacts that cannot be mitigated below threshold values for determining significance include short-term air quality impacts during construction (NO_x emissions from heavy equipment), and long-term impacts on visual resources in the area north of I-10 where the transmission line parallels the highway to reach the substation for interconnection to the southwestern grid. Alternative actions that could address these two impacts are described below.

4.9.2 Extended Construction Period Alternative

The only alternative action that could reduce the NO_x emissions to below the significance threshold would be to limit the number of pieces of equipment that could operate on any single day to keep NO_x emissions below the 100 lbs/day standard, thus extending the construction period.

Construction-related daily emissions associated with the proposed Project are presented, segregated by Project year and pollutant type, in Table 4-1. Typical daily emissions related to construction activities are highest in 2013 or 2014 (depending on pollutant) and are estimated to be less than: 463 ppd for CO, 60.5 ppd for VOC, 436 ppd for NO_x, 0.73 ppd for SO_2, 107 ppd for PM_{10} and 39.8 ppd for $PM_{2.5}$. These emissions are less than the SCAQMD CEQA thresholds for all pollutants except NO_x where the threshold is 100 ppd.

Table 4-1. Daily Construction Emissions (pounds)

Year	CO	VOC	NO_X	PM_{10}	$PM_{2.5}$	SO_2
2012	454	57.4	417	106	39.0	0.62
2013	444	60.5	436	107	39.8	0.70
2014	463	59.0	392	106	38.6	0.73
2015	122	12.8	74.0	89.3	23.7	0.16
Maximum	463	60.5	436	107	39.8	0.73
CEQA Threshold	550	75	100	150	55	150
Exceed threshold?	No	No	**Yes**	No	No	No

Source: KB Environmental Sciences, Inc., 2009.

Air pollutant emissions associated with long-term operations and maintenance (O&M) activities (employee, delivery vehicle trips, and miscellaneous area sources) would be minimal and would not exceed SCAQMD significance thresholds for operation. Operation-related annual emissions associated with the proposed Project are presented in Table 4-2 below.

Table 4-2. Annual Operational Emissions (tons)

CO	VOC	NO_X	PM_{10}	$PM_{2.5}$	SO_2	CO_2	N_2O	CH_4
1.85	0.05	0.16	0.03	0.02	0.00	332	0.01	0.02

Source: KB Environmental Sciences, Inc., 2009.

Therefore, the proposed Project will result in a significant construction-related impact from NO_x in construction years 2012, 2013, and 2014. This is attributable to the number of heavy construction vehicles and machines that will be required to construct the core Project works (reservoirs, dams, tunnels, powerhouse, and switchyard), and the linear components (water line and transmission line).

A variety of mitigation measures are prescribed for reducing air emissions overall, but these measures cannot reduce the NO_x emissions below the threshold level, and therefore this impact is deemed to be significant and unavoidable. (This impact is common to all large projects in the SCAQMD.)

The only alternative action that could reduce the NO_x emissions to below the significance threshold would be to limit the number of pieces of equipment that could operate on any single day to keep NO_x emissions below the 100 lbs/day standard. With NO_x emissions at approximately four times this threshold value, this implies that construction would need to be extended over a much longer period of time, and instead of 3 to 4 years for completion of Project works, construction would extend over 10 to 12 years or more.

This Alternative does eliminate the short-term construction related air quality impact, however, it may increase other impacts by extending the duration of habitat disturbance, and Project traffic and noise. This alternative would also substantially constrain attainment of Project goals by substantially extending the time to full Project operations, and it very likely would undermine the Project's ability to be financed, thereby fundamentally affecting feasibility of the Project.

4.9.3 Eastern Red Bluff Substation Alternative

The BLM, SCE, and California Independent System Operator (CAISO) considered two alternative substation sites, both south of the I-10. One is known as the eastern Red Bluff substation site (east of the community of Desert Center, California, Figures 4-1 and 4-2), the other the western substation site (west of Desert Center, just south of the Eagle Mountain Road interchange on the I-10. Interconnection to either of these two alternative substation locations will require coordination with California Department of Transportation for construction and operation of a 500 kV transmission line which crosses an interstate highway, the I-10.

In August, 2011 the BLM issued a Record of Decision which selected the Eastern Red Bluff substation as the interconnection location for the Chuckwalla Valley solar projects. BLM issued a Notice to Proceed for construction of the Red Bluff Substations and the overhead transmission line on its lands in September 2011. The Eastern Red Bluff Substation is currently (as of the time of this writing, January 2013) under construction.

In order to interconnect at the Eastern Red Bluff Substation, the proposed Project's transmission interconnection would follow one of two paths. One route would go east from the Central Project Site to Kaiser Road, then parallel (and west of) Kaiser Road to south of the town of Lake Tamarisk, then east (to the south of the Chuckwalla Sun Peak Solar Project), then south to the substation site. This alternative is displayed on Figures 4-1 and 4-2 as Interconnection Alternative Route #2. The other route to the Eastern Red Bluff Substation would parallel the existing SCE transmission line going southwest to a point just north of the proposed substation, then go south to the substation. This alternative is displayed on Figures 4-1 and 4-2 as Interconnection Alternative Routes #1A and #1B.

Under the Eastern Substation Alternative, significant visual impacts would be decreased in comparison to the proposed Project, principally due to relocation of the substation out of the panoramic viewshed of the Chuckwalla Valley.

Impacts to desert tortoise habitat would also be decreased in comparison to the proposed Project by this alternative. Interconnection Alternative Route #1A and #1B are entirely outside of the Desert Wildlife Management Area (DWMA). The Eastern Red Bluff Substation site is within the DWMA, but in a location with a lower density of desert tortoises than the Western Red Bluff Substation.

Interconnection Alternative Route #2 would be within the DWMA, and would disturb slightly fewer acres of the DWMA than the proposed Project transmission line. However, Interconnection Alternative Route #2 would be along the edge of the road right-of-way (ROW) at the boundary of the DWMA and would not bisect the DWMA as the proposed Project transmission line alignment and Interconnection Alternative Route #3 do.

Detailed field surveys of cultural resources, sensitive species, visual resources, and land use for this alternative were conducted in the spring of 2010. A summary of the results of those field surveys follows. A letter report describing the results of the cultural resources field surveys is found in Section 12.16.

4.9.3.1 Land Use

4.9.3.1.1 *Interconnection Alternative Routes #1A and 1B: East Route to Eastern Red Bluff Substation Alternative*

Nearly 86 percent of Interconnection Alternative Route #1A and #1B's 12.5 mile length would be located adjacent to an existing 160 kV wood H-frame transmission line owned by SCE (Figure 4-4). This alternative would pass near several residences that reside near the existing SCE line north of the Kaiser Road crossing. East of the Kaiser Road crossing the remainder of the route is relatively remote from existing residences. Interconnection Alternative Route #1A crosses the greatest amount of private land (4.9 miles *vs.*0.4 miles for the proposed Project route), and has 0.1 miles within the region's DWMA (0.1 miles *vs.*5.9 miles for with the proposed route). Three road crossings would be required including Kaiser Road, State Route 177, and I-10 (Table 4-4).

Interconnection Alternative Route #1A would pass within ¾-mile of the Desert Center Airport. The Desert Center Airport was sold by Riverside County several years ago to private individuals and is no longer a public airport. Interconnection Alternative Route #1B is slightly further from the airport property.

Several abandoned agricultural fields would be crossed by this alternative where it parallels the existing H-frame ROW between Kaiser Road and several miles south of State Route 177. Near the Desert Center Airport, the line may cross an active agricultural field if Interconnection Alternative Route #1B is selected. However, this crossing would be at the northeast corner of the field where tower placement would likely be able to span the field thereby avoiding direct impacts.

Interconnection Alternative Routes #1A and #1B would be further from the communities of Lake Tamarisk and Desert Center than either the proposed project or Interconnection Alternative 2, which passes immediately adjacent to the community of Lake Tamarisk.

Interconnection Alternative Routes #1A and #1B would be consistent with applicable land use plans and policies of the federal, state, and local governments with jurisdiction over the land in the Project area. This alternative will require additional coordination and permitting with the California Department of Transportation regarding the crossing of I-10.

Although Interconnection Alternative Routes #1A and #1B are approximately 3 miles longer than the proposed Project route, land use impacts associated with construction and operation would be similar or possibly less due to ROW sharing with the existing transmission line. Overall, land use impacts of the Eastern Red Bluff Substation and Interconnection Alternative Route #1A and #1B would be less than the proposed Project, largely due to the consolidation of lines, which meets desirable objectives to minimize the duplication or proliferation of multiple facilities in different locations, and to reduced encroachment on desert tortoise habitat.

4.9.3.1.2 *Interconnection Alternative Route #2: Kaiser Route to Eastern Red Bluff Substation Alternative*

Interconnection Alternative Route #2 would be located within undeveloped lands paralleling Kaiser Road to the west for approximately 5.3 miles of its total 14.8 miles – the longest of all the alternatives and proposed Project route. Prior to following Kaiser Road, the route would parallel the existing SCE 160 kV transmission line for approximately 3.3 miles before turning south at Kaiser Road. This alternative would pass within close proximity (less than a ¼-mile) to several existing residences located off Kaiser Road, including the entrance to the Lake Tamarisk residential community, as well as residences north of Desert Center.

At Desert Center, Interconnection Alternative Route #2 turns east, crossing Kaiser Road and State Route 177. A total of three road crossings, including I-10, would be required by the alternative; one more than the Project's proposed route. However, this Interconnection Alternative Route #2 would not require a pipeline crossing as with Interconnection Alternative Route #3. Near State Route 177 Alternative Route #2 would pass through abandoned agricultural fields (orchard and jojoba). Interconnection Alternative Route #2 would require a new ROW and a new access road east of State Route 177 (total of 6.3 miles new ROW *vs.* to 5.3 miles for the proposed Project).

Approximately 86 percent of Interconnection Alternative Route #2 lies within federal lands managed by the BLM, including the East Red Bluff Substation location. Interconnection Alternative Route #2 has slightly less length of transmission line passing through the region's DWMA (5.4 miles compared to 5.9 for the proposed Project).

Interconnection Alternative Route #2 would have short-term impacts associated with construction similar to the other alternatives and the proposed Project. While over 8.5 miles of this alternative's transmission line would follow developed road and utility ROWs, there would be over 6 miles of new ROW, a higher amount than the proposed Project or other alternatives.

Interconnection Alternative Route #2 would be consistent with applicable land use plans and policies of the federal, state, and local governments. This however is the same situation for the proposed Project and the other alternatives. This alternative would require additional coordination and a highway crossing permit from state and federal Highway Commissions for the I-10 crossing, which the proposed Project route does not require. Overall, land use impacts of the Interconnection Alternative Route #2 route would be slightly greater than the proposed Project.

4.9.3.2 Visual

The Eastern Red Bluff Substation is located entirely on BLM-managed lands and the BLM's Visual Resource Management (VRM) Class III designation (Figure 4-3).

The Eastern Red Bluff Substation alternative relocates the substation to the south of I-10 and out of the panoramic viewshed of the Chuckwalla Valley away from travelers on I-10. The Eastern Red Bluff Substation location avoids impacting the panoramic views of the Chuckwalla Valley that are prevalent along this stretch of the I-10 corridor. While an improvement over the proposed Project's current substation location, the substation's size, and discordant mass of equipment at varying heights, would create a strong contrast to the surrounding natural features that would dominate views from I-10 due to its location within foreground distance zones. Such views, however, would be brief; the substation becomes most visually apparent approximately 2 miles out, which at 70 mph would be visible for 2 minutes or less. The Eastern Red Bluff Substation would be noticeable from longer distances to west bound travelers due to the likelihood that several of the taller features would be skylined, as are the existing transmission line towers that draw the viewer's attention (KOP SI-1). Planting of desert vegetation at strategic locations and treatment of features (color, nonspecular material, etc.) would reduce visual contrast but not sufficiently within foreground view zones to avoid skylining or to meet VRM Class III designations.

There are three potential interconnection routes that were reviewed for the Eastern Red Bluff Substation alternative: Interconnection Alternative Routes #1A, #1B, and #2.

Interconnection Alternative Routes #1A and #1B connects with the proposed Project transmission line route north of the Metropolitan Water District's Pumping Station, then parallels the existing 160 kV wood H-frame transmission line owned by SCE on either its north or south side. These alternative routes would continue to parallel the existing line southeast, before turning south and leaving the existing H-frame line to cross I-10 to the Eastern Red Bluff Substation site.

Interconnection Alternative Routes #1A and #1B are approximately 12.5 miles in length (measured from the point of divergence from the proposed Project transmission route) (Table 4-3). Over 60 percent of the routes crosses through BLM managed lands and VRM Class III designations. The remainder of the routes cross VRM Class IV designations. The substation lies within VRM Class III lands.

Interconnection Alternative Routes #1A and #1B are located adjacent to an existing transmission line ROW for most of its entire length (10 of its 12.5 miles). Consequently, visual impacts are incremental to an existing infrastructure impact. The vertical forms of the lattice towers would be visible, but difficult to discern in middle-and background view distances as a result of the scale and mottled texture of the valley landscape. The routes would impact foreground views of travelers on State Route 177, but these are mitigated by the existing crossing of the SCE 160 kV line and vegetation along the road sides. With the exception of the I-10 crossing, alternatives #1A and #1B would create an incremental increase of the visual impact caused by the existing transmission line and would not dominate the view of the casual observer. The level of change created by this alternative would be moderate and would meet VRM Class III and IV designations (Table 4-3). The portion of this interconnection alternative that parallels the existing SCE transmission line has visual impacts which would be less than significant (KOP SI-2).

Approximately 2 miles from I-10, Interconnection Alternative Routes #1A and #1B turns south and leaves the existing transmission line ROW. The vertical form and lines of the lattice towers would become more visible as the route approaches the foreground view zone of I-10 (KOP SI-6). The route's perpendicular alignment and crossing of I-10 minimizes the extent and time the line would be visible from I-10 travelers, but the overall change in the foreground view zone caused by the towers and the proposed east substation would be high, creating a potentially significant impact.

Though Interconnection Alternative Routes #1A and #1B have potential visual impacts that would be potentially significant, overall significance of the visual impacts would be lower than the proposed Project alignment, due to relocation of the substation out of the panoramic viewshed of the Chuckwalla Valley and its co-location with an existing transmission line ROW. The Eastern Red Bluff Substation creates high visual contrast with its surroundings, but visibility is limited to a few minutes within foreground view zones due to the high rates of speed, with viewer interest typically focused away from the sites due to expansive valley views to the north.

Interconnection Alternative Route #2 is approximately 14.8 miles in length (measured from the point of divergence from the proposed Project transmission line), the majority of which (12.8 miles) passes through federal land managed by the BLM. The majority of this alternative route crosses VRM Class III designations. A small amount (2.3 miles) crosses Class IV designations located in the northern end of the route (Figure 4-3).

Interconnection Alternative Route #2 includes relocation of the substation to the Eastern Red Bluff Substation site, significantly reducing the proposed Project's adverse visual impact. However, it is offset by the placement of over 6 miles of the 500 kV double-circuit transmission line parallel to and within the foreground view zone of I-10 (KOP SI-3). In addition to crossing I-10, this alternative crosses State Route 177 and Kaiser Road within a ½ mile of their intersection north of the Desert Center community. Farther north, the transmission line would pass within the foreground zone and entrance to the Lake Tamarisk community. Due to the increased visibility at the road crossings, proximity to communities, and the extent of transmission line within foreground views of the Chuckwalla Valley viewshed, this alternative would have substantially greater visual impacts than the proposed Project route alignment. Therefore visual impacts of the Interconnection Alternative Route #2 would be significant (Table 4-3).

Operation of the new substation may result in a new source of light and glare from night lighting. This may be reduced by use of non-reflective materials and designs that minimize light glare, such as shielding.

Table 4-3. Interconnection Alternatives -Visual Resource Impact Summary

Project Feature	Visual Impact*			Mitigation	Remarks
	High	Moderate	Low		
Transmission Lines					High impact due to introduction of a new line into a landscape lacking similar built structures within fg/mg view zones of KOPs. Moderate Impact due to introduction of line within landscape lacking similar structures but sufficiently away from view zones to cause weak to moderate contrast. Low impacts due to construction in seldom seen areas or adjacent to existing structures.
proposed Project Route	2.5 miles	5.7 miles	1.4 miles	AES-2,4,5	
Alternative #1	1.7 miles	1.5 miles	9.3 miles		
Alternative #2	7 miles	4 miles	3.8 miles		
Alternative #3	2.1 miles	5.7 miles	1.4 miles		
Project Substation	X			AES-1,4	High impact due to strong visual contrast within fg view zone of Chuckwalla Valley

Project Feature	Visual Impact*			Mitigation	Remarks
	High	Moderate	Low		
West Red Bluff Substation	X			AES-1,4	High impact due to strong visual contrast within fg view zone; moderated somewhat by placement out of Chuckwalla Valley viewshed and near base of foothill mountains. View durations are short.
East Red Bluff Substation	X			AES-1,4	High impact due to strong visual contrast within fg view zone; moderated somewhat by placement out of Chuckwalla Valley viewshed. Possible skyline potential to westbound I-10 viewers.

High Impact - Strong visual contrast in fg/mg view zones from a number of KOPs. Mitigation unlikely to reduce impact significance. Inconsistent with VRM Class designations.

Moderate Impact - Visual contrast noticeable but not dominant as viewed from KOPs. Mitigation can reduce impacts to less than significant levels. Consistent with VRM Class designations.
Low Impact - Weak visual contrast and/or adjacency to existing built structures and development. Mostly within background or seldom seen view zones. Consistent with VRM Class designation. Mitigation not necessary.

* Line route miles reflect total lengths for alternative routes starting from a common starting point as indicated on Figure 4-3.

4.9.3.3 Biology

Surveys in spring 2010 found that desert tortoises are present but uncommon at the Eastern Red Bluff Substation alternative site. The substation is within a DWMA and designated critical habitat (Figure 4-2), but the habitat quality on-site and adjacent is much lower quality than the Western Red Bluff Substation alternative. It is also lower quality habitat than the proposed Project substation location. Therefore, the Eastern Red Bluff Substation location would have the least impact on desert tortoises of the three substation locations being considered for the proposed Project.

Interconnection Alternative Route #2, the route along Kaiser Road, passes along the outer edge of the DWMA. This area has relatively good habitat for biological resources. When the route turns east, the section that parallels the I-10 has lower habitat value and is not within a DWMA until it crosses the I-10 to reach the substation.

Interconnection Alternative Routes #1A and #1B have fewer biological resources overall than Interconnection Alternative Route #2.

It is estimated that a total of approximately 3.3 acres of state washes may be affected by Project activities if Alternative Routes #1A or 1B is selected, with the Eastern Red Bluff substation: 2.5 acres for the pipeline, 0.8 acres for the transmission line, and 0 acres for the Eastern Red Bluff substation. There will be no loss of hydrological function via construction and operation of the transmission line, substation, and pipeline.

4.9.3.4 Cultural Resources

A records search at the Eastern Information Center of an area extending 1 mile from Interconnection Alternative Routes #1A, #1B, #2, and #3 and Area of Potential Effect (APE) indicate that 30 cultural resources studies have been previously conducted, of which 18 bisect the APE. This record search does not include a recent survey conducted by ECORP Consulting, Inc. This survey covered much of the interconnection alternative routes and both alternative substation sites. Six of the previous studies provide overviews of cultural resources in the general area. Only two previous studies substantially cover elements of the alternatives. An archaeological assessment for TPM 18983 by Bowles (1983) covered most of the substation area and surrounding area. No sites were recorded during that survey, which may not have been a full Class III intensive survey and was conducted too long ago to meet current best professional practices.

Two prehistoric sites were recorded as being part of the APE located along Interconnection Alternative Route #2. The sites include a cleared circle and rock ring with distant quartz lithic assay-reduction (chipping) station and another prehistoric quartz chipping station.

Site P-33-015091. This prehistoric site consists of a cleared circle and poorly defined rock ring. Approximately 82 feet to the south is a quartz chipping station described as an assay/reduction station of 25-30 pieces of lithic debitage. This site and the one described below and were recorded by Applied Earthworks for an alternative alignment of the Devers-Palo Verde 2 Transmission Line Project.

Site P-33-015093. This prehistoric site consists of more than 50 pieces of quartz debris from a chipping station described as an assay/reduction station.

ECORP recently conducted a Class III inventory encompassing Interconnection Alternative Route #1A, #1B, the proposed Western Red Bluff Substation, Eastern Red Bluff Substation, and portions of Interconnection Alternative Routes #2 and #3. ASM Affiliates (ASM), under contract to ECE, surveyed the remainder of Interconnection Alternative Routes #2 and #3. ASM did not resurvey alternatives #1A and #1B or the substation alternatives. ASM relocated all of the sites recorded by ECORP within Interconnection Alternative Routes #2 and #3 and concurs with the character and content of the recordation, and to the best professional practices that characterize their survey and site records. ASM applied ECORP’s survey results to the proposed Project alternatives where appropriate.

Three historic sites, DS-326, DS-327, and DS-330 are recorded in within the Eastern Red Bluff Substation alternative. Based on preliminary significance evaluations, none of these sites are potentially eligible for listing in the National Register of Historical Places (NRHP).

Cultural Resources: Interconnection Alternative Route #1A and #1B

Three sites are recorded in Interconnection Alternative Route #1B: DS-316, DS-494, and DS-495. Preliminary eligibility assessments suggest that none of these sites represent significant resources. DS-316 consists of a historic trash scatter that is unlikely to produce significant research value worthy of consideration for listing in the NRHP. One of the ECORP sites, DS-495, straddles the center line delineating Interconnection Alternative Routes #1A and #1B may extend within both of these alignments, with the majority of the site concentrated in Alternative #1B. Both DS-494 and DS-495 consist of historic refuse deposits possibly associated with military operations conducted during World War II as part of the Desert Training Center/California-Arizona Maneuver Area (DTC/CAMA). Although the sites are potentially associated with this historically significant military undertaking, the lack of features and character of the artifacts make it unlikely that the sites are eligible for the NRHP. The date range and low quantity of military rations suggest these may be trash deposits that are more associated with the town of Desert Center than with the DTC/CAMA.

Cultural Resources: Interconnection Alternative Route #2

A total of 21 archaeological sites are recorded within Interconnection Alternative Route #2. Recorded sites include 13 historic refuse deposits, four prehistoric lithic scatters, three historic mining sites, and one prehistoric habitation site. Only one of these resources, DS-240, is potentially eligible for listing in the NRHP. DS-240 consists of a prehistoric habitation site containing lithic artifacts, ceramics, and fire affected rock (FAR). Although the site components are relatively sparse, further investigation of the site could provide information relevant to the poorly understood prehistoric utilization of the Chuckwalla Valley. Site DS-240 is discrete in size and can be avoided through Project design to mitigate effects.

4.9.4 Western Red Bluff Substation Alternative

The Western Red Bluff Substation is west of the town of Desert Center and south of the I-10. Interconnection Alternative Route #3 would provide interconnection to the Western Red Bluff Substation. The new substation would occupy approximately 80 acres, and would include electrical facilities and supporting infrastructure. The tallest structures in the substation would be dead-end structures, bus and transformers, ranging in height from 85 feet to 135 feet. A chain-link fence would surround the substation.

In order to interconnect at the Western Red Bluff Substation, Interconnection Alternative Route #3 would follow the same alignment south as the proposed Project except for the last 2.5 miles. At this location, the alternative would continue south, paralleling Eagle Mountain Road, crossing I-10 to the substation located at the terminus of Eagle Mountain Road south of I-10. Alternative #3 includes approximately 9.2 miles of a double-circuit 500 kV transmission line, 2.5 miles of which is different from the proposed Project route, as noted. This alternative is displayed on Figures 4-1 and 4-2 as Interconnection Alternative Route #3.

Under this alternative, significant visual impacts would be decreased in comparison to the proposed Project, principally due to relocation of the substation out of the panoramic viewshed of the Chuckwalla Valley.

However, desert tortoise impacts would be increased by this alternative. The substation site is located in an area with a higher density of desert tortoises, and desert tortoise habitat, than the proposed Project substation. In addition, the transmission line would need to cross the area of the Desert Training Center historic hospital site, an area of historical importance.

Detailed field surveys of this alternative were conducted in the spring of 2010. A summary of the results of those field surveys follows.

4.9.4.1 Land Use

Interconnection Alternative Route #3 will have land use effects similar to the proposed route since it follows the same alignment south as the proposed Project, except for the last few miles. The route would follow the Eagle Mountain Road ROW for 6.6 of its 9.2 mile length (Table 4-4). Over 96 percent of the route (8.8 miles) would be on federal lands managed by the BLM. This route is the furthest from any developed communities (Desert Center and Lake Tamarisk). Like the proposed Project transmission line, construction of the route would introduce a new transmission line into a relatively undeveloped area. This alternative however, would reduce the amount of new ROW across undeveloped, non-roaded area compared to the proposed Project transmission line by over half (2.6 miles compared to 5.3 miles of “new” ROW for the proposed Project).

No agricultural areas would be affected by the Alternative #3 route, similar to the proposed Project (Figure 4-4). Recreational access to surrounding federal and nonfederal lands may be temporarily affected during construction, similar to those described for the proposed Project.

Interconnection Alternative Route #3 would require two road crossings, Eagle Mountain Road in the north, and a crossing of I-10, which the proposed Project avoids. This alternative would also require the crossing of and coordination with existing pipelines that parallel I-10 on the north. The new substation location lies on private land in comparison to federal land for the proposed Project’s substation location. Additionally, this alternative results in less development within the area’s DWMA (4.7 miles), compared to the proposed Project (5.9 miles). Temporary impacts due to construction activity and traffic would be similar in scope and significance to the proposed Project, with the exception of a temporary increase in traffic around the Eagle Mountain Road/I-10 interchange during the transmission line and substation construction period.

The Western Red Bluff Substation and Interconnection Alternative Route #3 would be consistent with applicable land use plans and policies of the federal, state, and local governments with jurisdiction over the land in the Project area. This alternative will require additional coordination and permitting with the California Department of Transportation regarding the crossing of I-10. Overall, land use impacts of the Western Red Bluff Substation and Interconnection Alternative Route #3 would be slightly less than the proposed Project.

4.9.4.2 Visual

Interconnection Alternative Route #3 crosses entirely through VRM Class III designations, except for a small area designated as VRM Class II, located immediately south of the Eagle Mountain Road/I-10 intersection (Figure 4-3). The VRM Class II designation is part of the BLM's existing VRM process, completed from earlier studies. The Western Red Bluff Substation site, which is located on private land, resides within VRM Class III, based on application of the BLM methodology to private lands for this study.

Interconnection Alternative Route #3 reduces the visual impact compared to the proposed Project by crossing the interstate perpendicular, thus lessening the extent and time the line would be visible by travelers on I-10, as compared to the longer, angled alignment created by the proposed Project route, even though it does not cross I-10 (KOP SI-4).

Relocating the substation to the south of I-10 and out of the panoramic viewshed of the Chuckwalla Valley from I-10 travelers, significantly reduces the proposed Project's adverse visual impact. However, the Western Red Bluff Substation's location will intrude on views of Alligator Rock from east-bound travelers on I-10, but only for a short time as intervening topography and the road's vertical alignment screen views until travelers are within 2 miles of the site (KOP SI-5). The Western Red Bluff Substation's location near a mountain backdrop and lack of skylining further reduces its visual contrast. However, it's mass of complex, angular structures with varying heights within foreground views from I-10 would dominate views, and intrude upon scenic views of Alligator Rock, albeit briefly due to the high rates of speed on I-10.

Operation of the new substation may result in a new source of light and glare from night lighting. This may be reduced by use of non-reflective materials and designs that minimize light glare, such as shielding. Most of the transmission line would be within middleground and background view zones. The tower's lattice structure and avoidance of skylining reduces visual contrast to less than significant in these locations. However, the double circuit lattice towers would begin to dominate views within foreground distance zones (0 to ¾ mile). The visual change here would be high and would not meet BLM VRM Class II or III designations (Table 4-3).

Overall, visual impacts for the transmission features and the substation located within foreground distance zones for the Interconnection Alternative Route #3 alignment would be potentially significant. Even so, this alternative is considered to have a lower overall significance of visual impact than the proposed Project alignment, due to the relocation of the substation out of, and less transmission line length within the, panoramic viewshed of the Chuckwalla Valley. While the Western Red Bluff Substation would intrude on partial views of the scenic Alligator Rock for eastbound travelers, only the upper portion of Alligator Rock is visible, and from distances of over 2.5 miles. Travelers would be past the substation location before having clear, unobstructed views of Alligator Rock.

4.9.4.3 Biology

The Western Red Bluff Substation Alternative site hosts abundant desert tortoise sign and is high-quality desert tortoise habitat. Four tortoises, two burrows, and numerous scat were observed during Spring 2010 surveys. In addition, numerous tortoise sign were observed in the surrounding area and the site is connected to high-quality desert tortoise conservation areas (Chuckwalla DWMA) and designated critical habitat. In addition to desert tortoises, the site hosts several large populations of *California ditaxis,* a CNPS List 4 and Northern and Eastern Colorado Desert Plan (NECO) special-status species. Several state-jurisdictional drainages also cross this substation alternative.

4.9.4.4 Cultural Resources

The records search found two historic World War II Desert Training Center/Arizona-California Maneuver Area (DTC/CAMA) sites recorded within the APE of Alternative #3 along Eagle Mountain Road.

Site P-33-015921. This site is an approximately 148-foot long rock alignment marking the edge of a tent associated with the 36^{th} Evacuation Hospital. The hospital was stationed here from May to December, 1943 as part of the DTC/CAMA. The site was recorded by SCE for the North Alligator Rock Alternative of the Devers-Palo Verde 2 Transmission Line Project. To the south of the archaeological complex, of which this site is a part, is a plaque and monument recognizing the historical significance of the 36^{th} Evacuation Hospital, dedicated May 2, 2009 by the BLM and Bill Holcomb Chapter of E Clampus Vitus.

Site P-33-017642 (CA-RIV-9139). This site consists of three rock-lined tent bases and a flag pole base that appears to be associated with the 36^{th} Evacuation Hospital. A contemporary World War II era artifact scatter is associated with the site. The site is located near Eagle Mountain Road.

Field surveys conducted in 2010 found a total of nine sites are recorded in the area of the Western Red Bluff Substation. These resources include three sites associated with historic mining, three prehistoric lithic scatters, one historic telephone/telegraph line, one historic refuse deposit, and a possibly historic fire ring. None of the resources recorded in the Western Red Bluff Substation are recommended as potentially eligible for listing in the NRHP based on preliminary evaluations.

Field surveys found three sites that were recorded within Interconnection Alternative Route #3. Two of these sites, P-33-17642 and P-33-15971 are potentially eligible for the NRHP. Both sites consist of historic features related to the DTC/CAMA, and are both potentially associated with 36^{th} Evacuation Hospital. The third site, DS-203, represents the remains of a possible historic road, and is not likely eligible for listing in the NRHP.

Interconnection Alternative Route #3 has the potential to cause direct and indirect impacts to physical remains of the 36th Evacuation Hospital site and other associated remains from the

World War II era DTC/CAMA. The hospital complex was located between Camp Young to the west and Camp Desert Center to the east. Much of the main hospital complex road alignment and archaeological remains extent north of the I-10 and extend on both sides of Eagle Mountain Road.

Additional remains extend further north for several miles. The potential exists for a NRHP District or Multiple Resources to be located on a substantial area on either side of the Eagle Mountain Road. The site would also be eligible for listing in the California Register of Historic Resources (CRHR). Direct impacts and visual impacts to the complex are to be anticipated from the construction of a transmission line. Existing and on-going records of the main 36th Evacuation Hospital site, P-33-17542, confirm that Interconnection Alternative Route #3 is likely to have the greatest direct and indirect impacts to a historic property and its setting of any of the interconnection alternatives.

Table 4-4. Comparison of Interconnection Alternative Routes.[1]

	Proposed Plan	ALT 1A and 1B East	ALT 2- Kaiser Rd	ALT 3 - West
Total Length (miles)*	9.6	12.5	14.8	9.2
Visual Sensitivity (miles)				
Low	-	2.1	1.8	-
Medium	-	3.3	2.2	-
High	9.6	7.1	10.8	9.2
Scenic Quality (miles)				
A	-	-	-	-
B	1.4	0.3	0.3	1.4
C	8.2	12.2	14.5	7.8
VRM Class (miles)				
I	-	-	-	-
II	-	-	-	0.2
III	8.7	7.9	12.5	8.2
IV	0.9	4.6	2.3	0.8
DWMA (miles)[2]				
Chuckwalla	5.9	0.1	5.4	4.7
Outside	3.7	12.4	9.4	4.5
Ownership (miles)				
BLM	9.2	7.6	12.8	8.8
Private	0.4	4.9	2.0	0.4

[1] All distances measured from a common divergence point, south of the Central Project Area.
[2] Acreage of surface disturbance for the proposed Project and for each transmission alternative, measured from the Project switchyard, is calculated in the Revised Draft Biological Assessment (July 2010)

	Proposed Plan	ALT 1A and 1B East	ALT 2- Kaiser Rd	ALT 3 - West
Road Crossings	2	3	3	2
	Eagle Mtn	Kaiser Rd	Kaiser Rd	Eagle Mtn
	Eagle Mtn	Route 177	Route 177	I-10
		I-10	I-10	
Proximity to Communities				
Transmission Line	Within 1 mi Desert Center	~ 3 mi from Lake Tamarisk, ~ 5 mi from Desert Center	Adjacent to Lake Tamarisk, within 1 mi of Desert Center	~ 4.5 mi from Lake Tamarisk and Desert Center
ROW (miles)				
Adjacent to Existing Road	4.3	-	5.3	6.6
Adjacent to Utility ROW	-	10.8	3.3	-
New ROW	5.3	1.7	6.2	2.6
Residential w/in 1/4 mile	-	1 area	2 areas	-
Airport w/in 1 mile	-	Yes[3]	-	-
Substations	**Ownership**	**DWMA**	**Desert Tortoise Critical Habitat**	
proposed Project	BLM	No	No	
Western Red Bluff	Private	No[4]	Yes	
Eastern Red Bluff A-1	BLM	Yes[5]	Yes	

* Distances noted are from a common "diverge" point, located south of Central Project Site.

4.9.5 No Project Alternative

Under the No Project Alternative, the State Water Board would deny water quality certification for the Eagle Mountain Pumped Storage Project. The Project would not be built, and no change to the existing environment would occur. All potentially significant environmental effects would be eliminated, and unavoidable impacts related to air emissions and visual quality along the I-10 corridor would not occur, and the Project would not contribute to a potential cumulative overdraft of the groundwater basin.

The No Project scenario may affect the long-term reliability of the transmission system. According to the California Energy Commission, the California Public Utilities Commission, and the California Independent System Operator, California needs large scale energy storage systems in the near future as an essential component of integrating renewable energy sources. At 1,300 MW generating capacity, this proposed Project is the largest energy storage project

[3] Desert Center Airport, privately owned
[4] However, field surveys indicate desert tortoises are present at this site
[5] Field surveys indicate low abundance of desert tortoises at this site

proposed in the state, and the only proven technology for large scale energy storage. Under the No Project scenario, it is recognized that attainment of the state's Renewable Portfolio Standard will be more difficult to achieve, with consequences for attainment of greenhouse gas emissions reduction as well.

4.10 Determination of the Environmentally Superior Alternative

Based upon the elimination of Project impacts to aesthetics, groundwater, and air quality, the environmentally superior alternative would be the No Project Alternative. However, while addressing Project-specific impacts, the No Project alternative would eliminate a major utility-scale energy storage project from development, with the likely effect of impeding state goals for successful integration of renewable energy generation sources by year 2020. This outcome would have related consequences for attainment of greenhouse gas reduction goals by year 2020 as well. With this perspective, the conclusion that the No Project alternative is environmentally superior is questionable.

CEQA directs that in the case where the No Project Alternative is identified as the environmentally superior alternative, the EIR shall also identify the environmentally superior *development* alternative (Guidelines §15126.6(e)). As documented in Section 4.7 above, numerous development alternatives were examined and rejected as either infeasible, or having greater potential environmental consequences. These included alternative locations, water supply and water treatment, powerhouse location, and reservoir capacities.

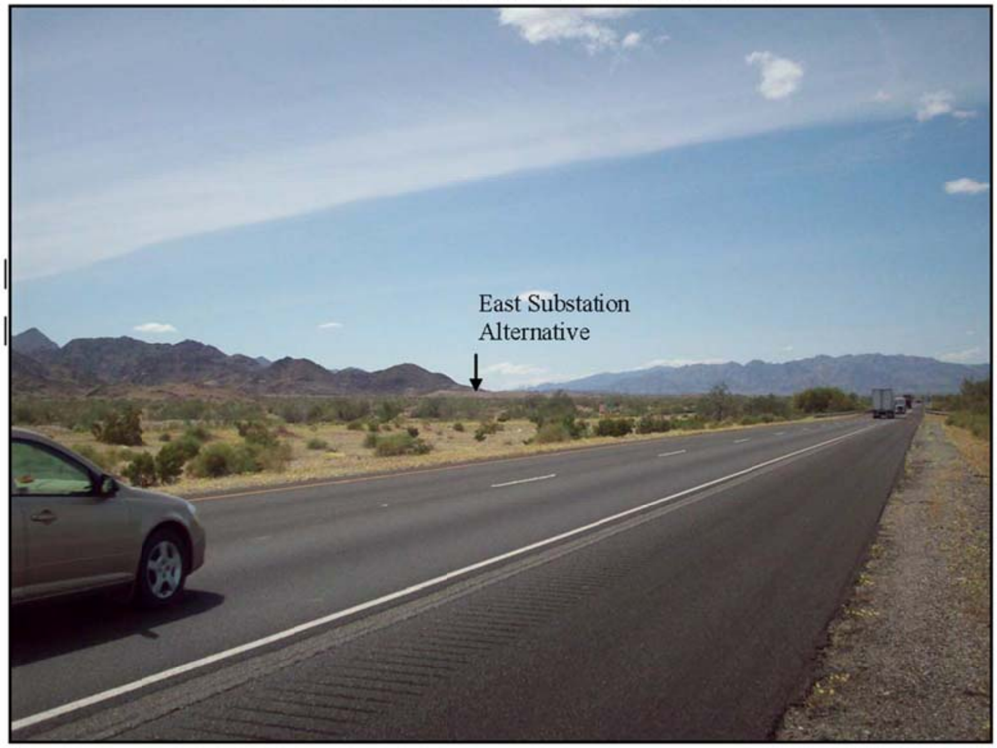
The proposed Project Alternative has evolved substantially over a period of years to include a variety of features (described in Section 4.6 above) intended to specifically address and minimize potential environmental effects. This alternative also includes incorporation of a comprehensive mitigation program intended to avoid or minimize environmental effects to the extent feasible, while still permitting attainment of basic Project goals and objectives. Impacts to groundwater, air quality during construction, and aesthetics remain significant with the application of the mitigation program. It is concluded that *Alternative 1, the proposed Project with incorporation of all identified Project Design Features and all identified mitigation measures, is the environmentally superior development alternative.*

Two alternative substation locations and three alternative interconnection routes were examined. Both of the alternative substation locations have less visual impact than the proposed Project. However, the western substation location has greater impacts to desert tortoise and cultural resources than either the proposed Project or the eastern substation location. In addition, the Eastern Red Bluff substation location has been selected by the BLM as the interconnection location for the proposed solar energy projects under development in the Chuckwalla Valley. The Eastern Red Bluff Substation is currently under construction. Therefore, interconnection of the proposed Project at the Eastern Red Bluff site would have less environmental impact than any other possible interconnection location.

Therefore, *the eastern substation site is the environmentally preferred substation location*.

Two alternative interconnection routes were examined to interconnect to the eastern substation location. Interconnection Alternative #1A and #1B have less impact to desert tortoise, land use, and visual resources than Interconnection Alternative 2, with Alternative #1A having slightly fewer impacts to biological resources than Alternative #1B. Therefore, *Interconnection Alternative #1A is the environmentally superior interconnection alternative*.

Eagle Mountain Pumped Storage Project-Interconnection Alternatives
Visual Resource- Key Observation Point #SI-1



Location: *East Red Bluff Substation Alternative Site*
Description: *Existing Condition: View west-southwest from I-10 toward location of Alternative Red Bluff Substation site.*
View Distance to Nearest Project Feature: *MG-FG, ¾ mile*
Visible Project Features: *Transmission Line, Substation*
VRM Class: *III (SQ = C, VS = High).*
Remarks: *Transmission line alternatives #s 1 and 2 would cross I-10 to substation location. Perpendicular crossings of I-10 will minimize view duration of the lines, but will not meet BLM VRM management objectives for Class III designations within the FG view zone, brief as it will be (less than a minute at typical interstate travel speeds). Substation features will be screened from east-bound views for some distance due to intervening topography. West bound views will be more pronounced with visual contrast due to potential for taller features to be skylined. Location of substation out of Valley viewshed (to right) reduces visual impact, but strong visual contrast in FG views will not meet BLM VRM Class III management objectives.*

(See Figure SI-3 for KOP Locations)

KOP-SI-1

Eagle Mountain Pumped Storage Project-Interconnection Alternatives
Visual Resource- Key Observation Point #SI-2

Location: *I-10 View North- Northwest*
Description: *Existing Condition: View north-northwest toward location of Alternative Transmission Line Route #1.*
View Distance to Nearest Project Feature: *MG- 1+ miles*
Visible Project Features: *Transmission Line*
VRM Class: *III (SQ = C, VS = High).*
Remarks: *Transmission line would parallel existing H-frame transmission line shown in distance before turning to cross I-10 approximately one mile to west (left side photograph). Perpendicular crossing of I-10 will minimize view duration of the line, but will not meet BLM VRM management objectives for Class III designations within the FG view zone, brief as it will be (less than a minute at typical interstate travel speeds).*

(*See Figure Si-3 for KOP Locations*)

KOP-SI-2

Eagle Mountain Pumped Storage Project-Interconnection Alternatives
Visual Resource- Key Observation Point #SI-3

Location: *I-10 View North*
Description: *Existing Condition: View north toward location of Alternative Transmission Line Route #2.*
View Distance to Nearest Project Feature: *FG- ¼ mile to ¾ miles*
Visible Project Features: *Transmission Line*
VRM Class: *III (SQ = C, VS = High).*
Remarks: *Transmission line would parallel I-10 crossing (left-to-right) in FG view zone. Location of features, as noted, in FG view zones will not meet BLM VRM management objectives for Class III designations.*

(*See Figure SI-3 for KOP Locations*)

KOP-SI-3

Eagle Mountain Pumped Storage Project-Interconnection Alternatives
Visual Resource- Key Observation Point #SI-4

Location: *West Red Bluff Substation Alternative Site*
Description: *Existing Condition: View north from substation site toward Alternative #3 transmission line crossing. I-10 in FG/MG view zone. Eagle Mtn Road in MG/BG view zone. Alternative #3 transmission line would parallel Eagle Mtn Road to substation.*
View Distance to Nearest Project Feature: *FG - substation, transmission line crossing I-10.*
Visible Project Features: *Transmission Line, Substation.*
VRM Class: *II (ACEC influence), III (SQ = C, VS = High).*
Remarks: *Perpendicular crossing of I-10 will minimize view duration of transmission line as much as possible. Substation location against mountain backdrop and out of valley viewshed minimizes impact. Location of features, as noted, in FG viewzones will not meet BLM VRM management objectives for Class II and Class III designations.*

(*See Figure SI-3 for KOP Locations*)

KOP-SI-4

Eagle Mountain Pumped Storage Project-Interconnection Alternatives
Visual Resource- Key Observation Point #SI-5

Location: *I-10 View East*
Description: *Existing Condition: View east toward West Red Bluff Substation site approximately ¼ mile in distance, south (right) of I-10.*
View Distance to Nearest Project Feature: *FG/MG edge - point at which substation starts to become apparent to motorists.*
Visible Project Features: *Transmission Line, Substation.*
VRM Class: *II (ACEC influence), III (SQ = C, VS = High).*
Remarks: *Perpendicular crossing of I-10 will minimize view duration of transmission line as much as possible. Substation location against mountain backdrop and out of valley viewshed minimizes impact. Substation features will begin to intrude on views of Alligator Rock. Location of features, as noted, in FG viewzones will not meet BLM VRM management objectives for Class II and Class III designations.*

(See Figure SI-3 for KOP Locations)

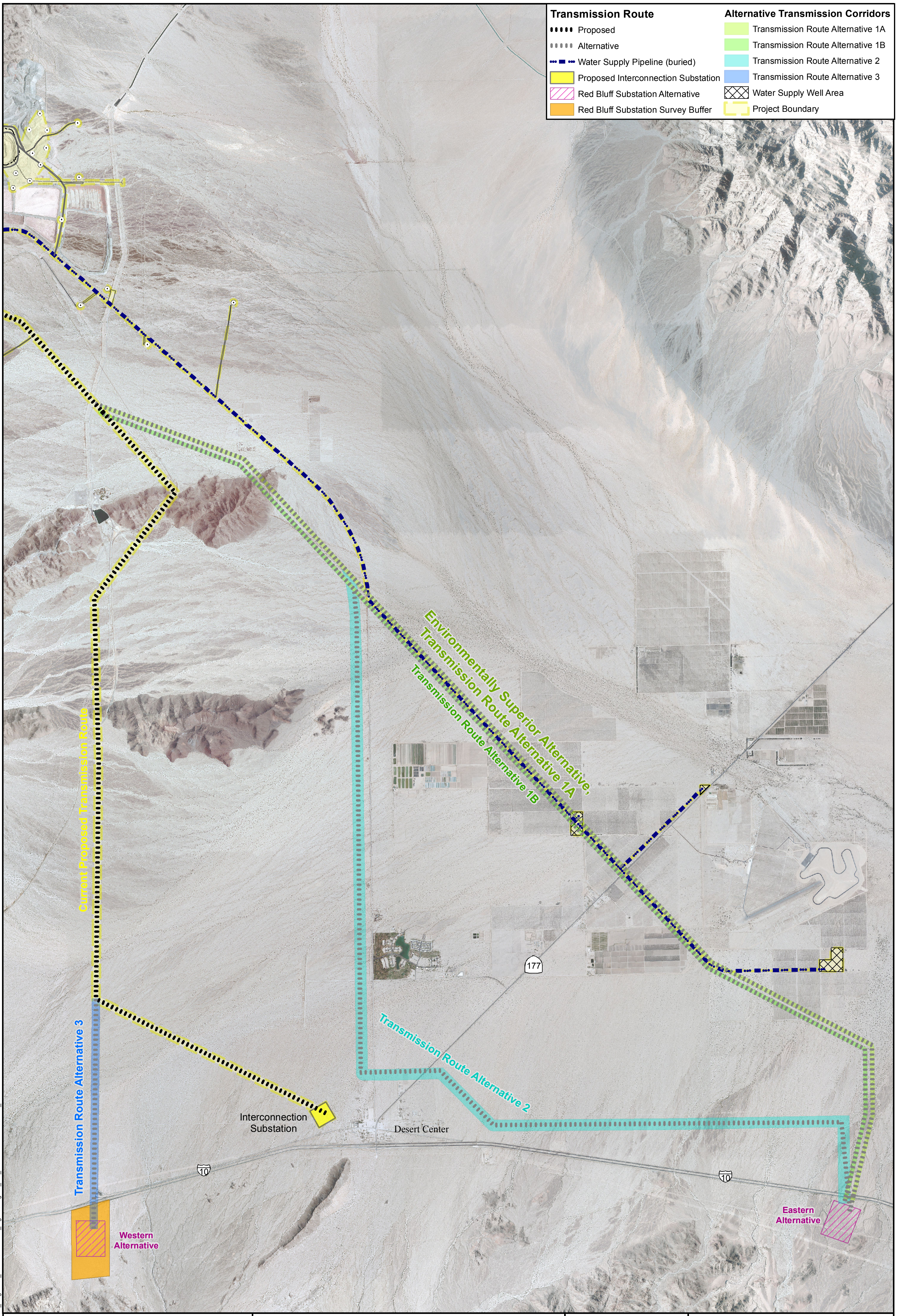
KOP-SI-5

Eagle Mountain Pumped Storage Project-Interconnection Alternatives
Visual Resource- Key Observation Point #SI-6

Location: *I-10 View west-northwest, Alternative #1/#2 Crossing*
Description: *Existing Condition: View north-northwest toward location of Alternative Transmission Line Route #1 and Route #2 crossing.*
View Distance to Nearest Project Feature: *FG/MG- ½ mile, +*
Visible Project Features: *Transmission Line*
VRM Class: *III (SQ = C, VS = High).*
Remarks: *Transmission lines would cross I-10 roughly at curve in road approximately ½ mile from view point. Alternative #1 would continue approximately 1.7 miles to northeast in distance before turning to parallel existing H-frame structures (see KOP-SI-2). Alternative #2 would continue to north for ¾ mile, then turn west (see KOP-SI-3). Perpendicular crossing of I-10 will minimize view duration of the line, but will not meet BLM VRM management objectives for Class III designations within the FG view zone, brief as it will be (less than a minute at typical interstate travel speeds).*

(See Figure SI-3 for KOP Locations)

KOP-SI-6



SOURCE: USDA FSA Aerial Photography Field Office: County image mosaic for Riverside, CA (2010)

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N

Environmental Impact Report
prepared for State Water Resources Control Board
by GEI Consultants, Inc.

Eastern Riverside County, California

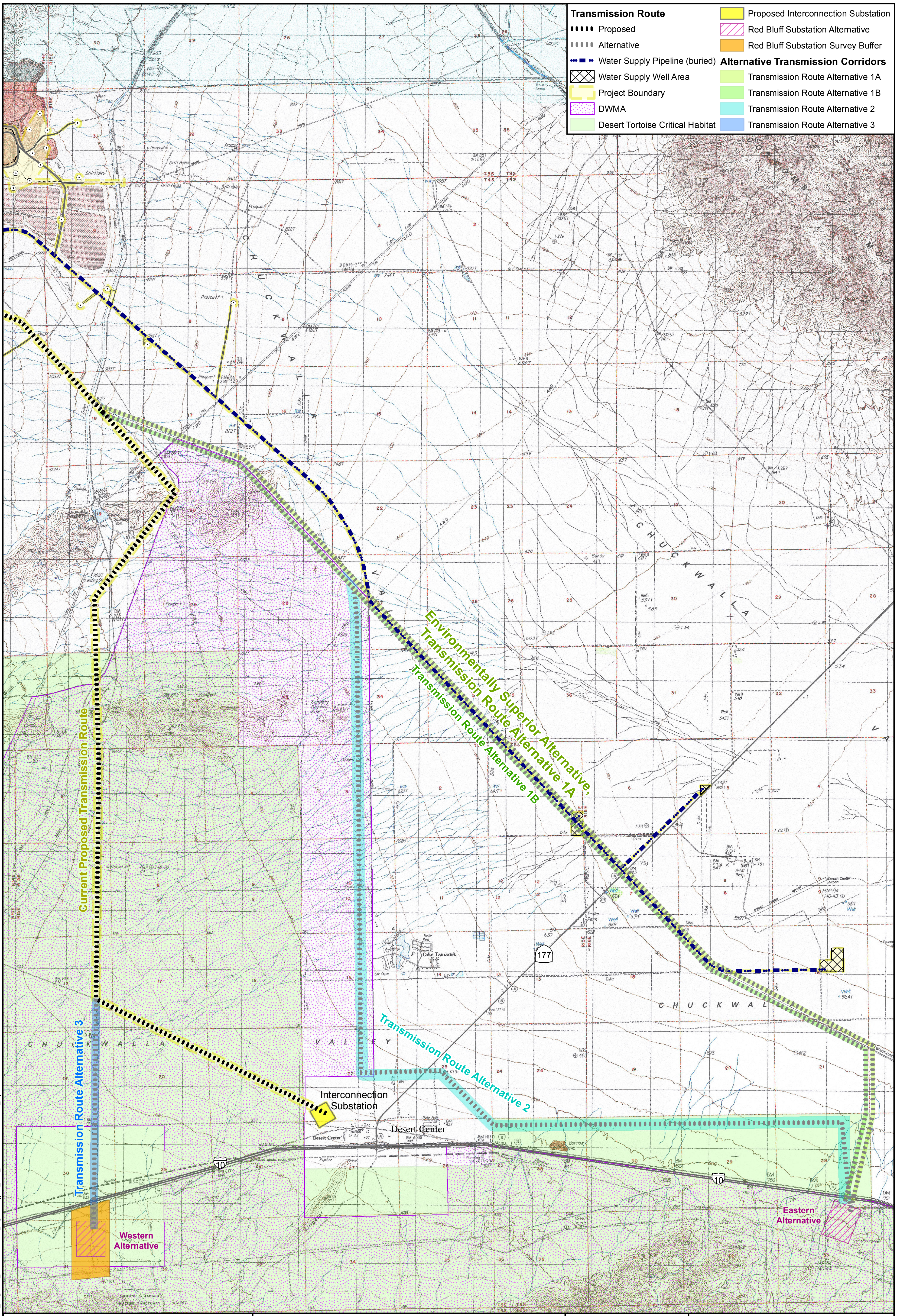
California Water Boards
State Water Resources Control Board
Regional Water Quality Control Boards

TRANSMISSION ALTERNATIVES, AERIAL PHOTOGRAPHIC BASE

January 2013

Figure 4-1

13-Feb-2012 Z:\Projects\080472_EagleMtn_fromDenverEIR_Figures\Figure_4-1_TransmissionRouteAlts_aerial.mxd SET



SOURCE: CalAtlas for USGS Topographic 7.5" image.

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Eagle Mountain Pumped Storage Project
Eagle Mountain, California

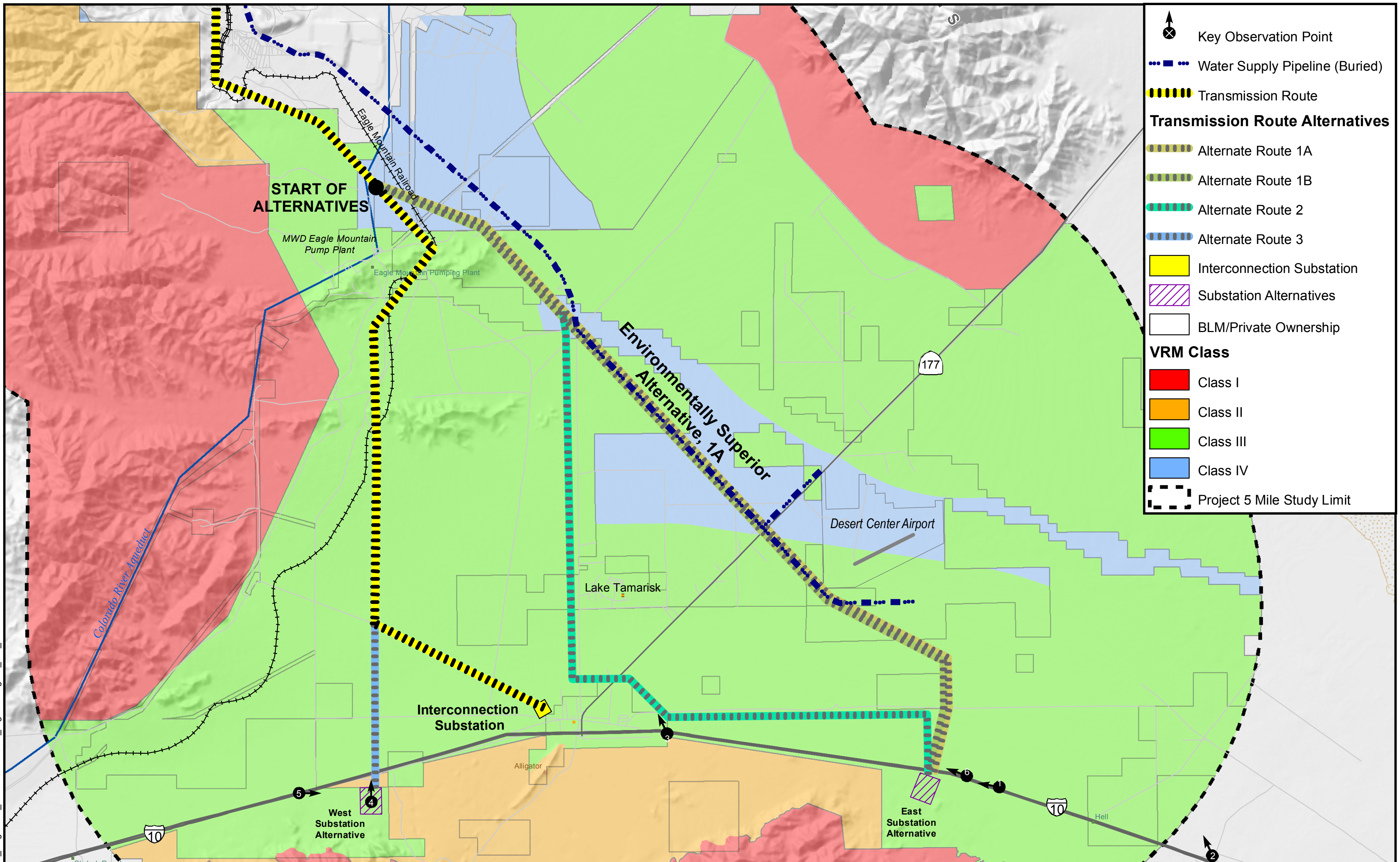
Eagle Crest Energy Company

CALIFORNIA Water Boards STATE WATER RESOURCES CONTROL BOARD REGIONAL WATER QUALITY CONTROL BOARDS

TRANSMISSION ALTERNATIVES, TOPOGRAPHIC BASE

January 2013 Figure 4-2

13-Feb-2012 Z:\Projects\080472_EagleMtn_fromDenver\EIR_Figures\Figure_SI-2_TransmissionRouteAlts_topo.mxd SET



Environmental Impact Report
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Eastern Riverside County, California

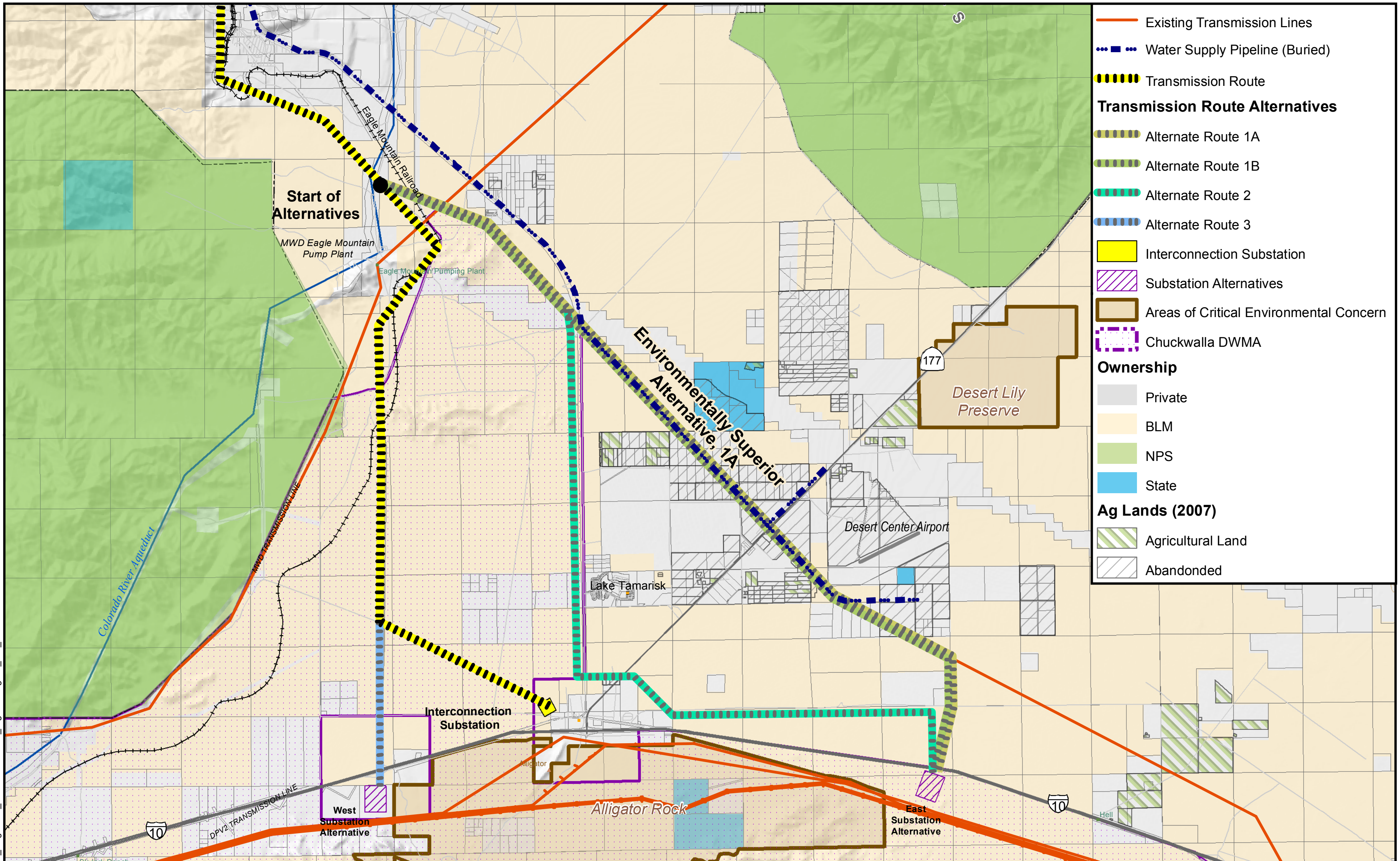
CALIFORNIA Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

VISUAL RESOURCES TRANSMISSION LINE ALTERNATIVES

January 2013

Figure 4-3

13-Feb-2012 Z:\Projects\080472_EagleMtn_fromDenverEIR_Figures\Figure_4-3_VisualResources.mxd SET



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Eastern Riverside County, California

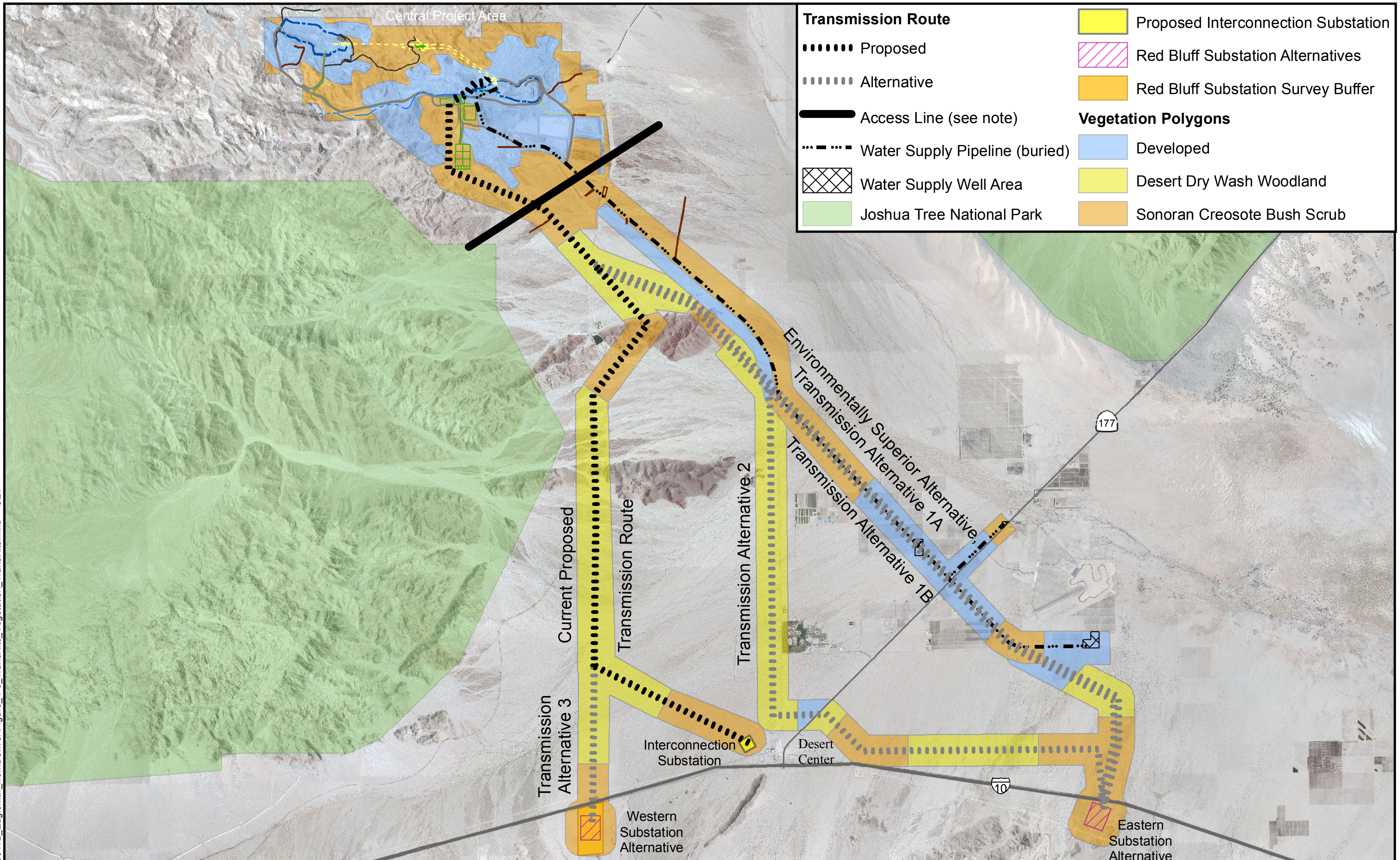
CALIFORNIA Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

LAND USE
TRANSMISSION LINE
ALTERNATIVES

January 2013

Figure 4-4

10-Feb-2012 Z:\Projects\080472_EagleMtn_fromDenverEIR_Figures\Figure_4-4_LandUse.mxd SET



NOTE: Mapping northwest of Access Line is based on aerial photographs and ground views rather than direct site access.
SOURCE: USDA FSA Aerial Photography Field Office: County Image Mosaic for Riverside, CA (2010).

0 1 2 Miles

N

Eagle Mountain Pumped Storage Project
Eagle Mountain, California

Eagle Crest Energy Company

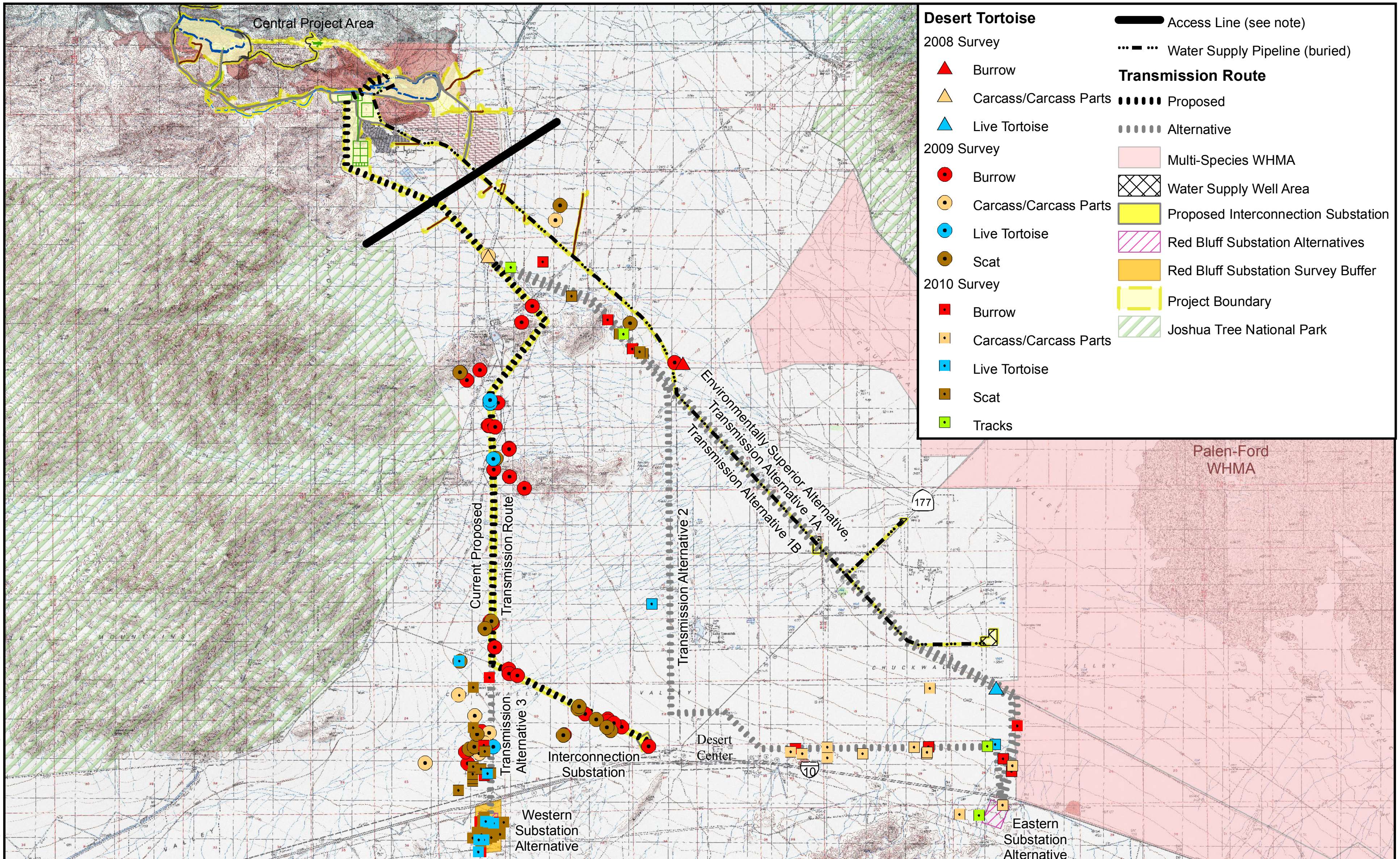
CALIFORNIA Water Boards STATE WATER RESOURCES CONTROL BOARD REGIONAL WATER QUALITY CONTROL BOARDS

SUBSTATION ALTERNATIVES AND TRANSMISSION INTERCONNECTION ALTERNATIVES; VEGETATION IN PROJECT AREA

January 2013

Figure 4-5

13-Feb-2012 Z:\GIS\Projects\080472_EagleMtn_fromDenver\Figure_4-5_TransAlts_Vegetation_TransAlts.mxd SET



NOTE: Mapping northwest of Access Line is based on aerial photographs and ground views rather than direct site access.

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Miles

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Eagle Mountain Pumped Storage Project
Eagle Mountain, California

Eagle Crest Energy Company

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RESULTS OF SPECIAL BIOLOGICAL RESOURCES SURVEYS IN 2008, 2009, 2010: DESERT TORTOISE

January 2013

Figure 4-6

13-Feb-2012 Z:\Projects\080472_EagleMtn_fromDenver\Figure_4-6_BioSurveys_DesertTortoise_TransAlts.mxd SET